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Production Control in Pump Plant

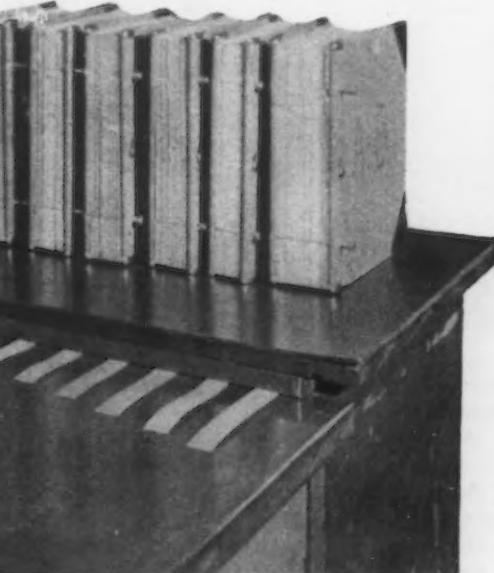
Interlocking System Relieves Foremen of Much
Routine "Paper Work"—A Long Look Ahead
—Employee Morale Considered

BY SIDNEY G. KOON

CONTROL of production in the manufacture of a considerable line of pumps of various descriptions is handled by the Nash Engineering Co., South Norwalk, Conn., in a very effective manner. For the most part all production machines in the plant

are scheduled for some time in advance, some of the schedules running as far ahead as two months. A visual control board occupies the entire side of a good-sized room and from floor to ceiling. Access to the upper portion is provided by a sliding ladder.

Essentially this board consists of about 110 long horizontal strips of metal with both edges bent over so that operation planning cards may be snapped into place and held securely. Each

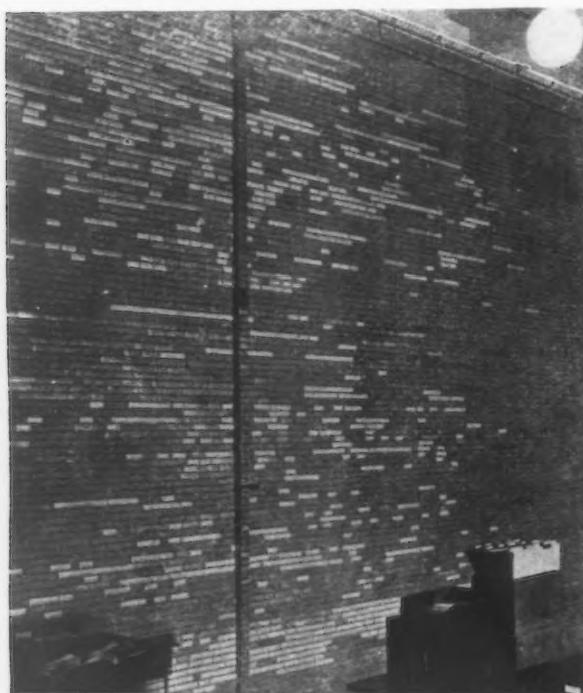


WHERE the System Starts. "Planning Slips" of colored cardboard, cut off to a length corresponding with the scheduled time of operation, go into the production control board, a portion of which appears behind the young lady. The desk is graduated in hours, corresponding to the scale on the control board. Inset shows how the cardboard is carried in rolls.

Several colored pencils are used

strip is about $1\frac{1}{4}$ in. wide and runs the whole length of the room. A vertical bar of wood, running on rails top and bottom, may be moved from left to right along this board. This forms the synchronizing element, based on the dates carried across at the top of the board. The bar carries on its face the designation of the various machines, one represented by each strip. This same designation or number appears at the end of the board.

Each operation card or *Planning Slip* on the board indicates by its color the type of pump to which it applies. The one shown is canary yellow. The card indicates by its length the estimated total time required for performing the particular operation involved, on the number of pieces designated. It carries on its face the drawing number (D-4141), the lot number (7658L2), the number of pieces to be produced (100), the standard time for each piece (0.06 hr.), the scheduled machine (No. 67), the character of the operation (A-1, meaning ream and cut off), the set-up (15,948) of tools to perform the A-1 operation, and occasionally other information. *B*, in lower right corner, indicates



the next destination of the piece, for the next subsequent operation.

As the card designates the total time estimated for the operation, its length corresponds with the product of the number of pieces (100) multiplied by the standard time (0.06 hr.) for each piece. Each card remains on the board until the particular operation it represents is finished, when it is at once removed.

Tool Room an Element in Control

As a part of the system, a control card or *Home Set-Up* in the tool room designates all the operations—facing, drilling, counterboring, etc.—which may be required on a given piece, at a given machine. It lists the tools, jigs and other equipment necessary to perform each operation and gives the drawing number.

Associated with this is the *Set-Up Requisition* card shown, which again designates the number of the set-up, blueprint number, machine number and operation, and tells the day and hour when the set-up will be needed at the machine. In the case shown, the hour is given as 11 a. m., and the card calling for this set-up will normally be sent to the tool room, by the foreman, about 8 a. m.

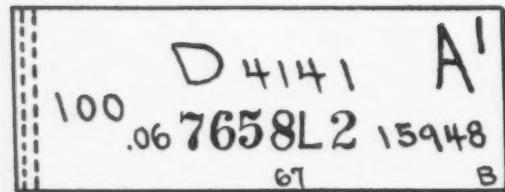
In the tool room the complete outfit of all the tools, jigs and other tool room equipment required to per-

form the operation is put together in a metal basket, in advance of the time it is required at the machine. This basket contains also a leather envelope with transparent celluloid face, in which are placed the blueprint governing the operation, a card giving detailed instructions as to what is to be done to the piece on that machine, and a slip designating the operator who is to perform the work.

Scheduling usually takes such a form that this assembly of tools in the metal basket may be made several hours in advance of the stipulated time of use. Sometimes this is the day before but almost always it is at least an hour ahead of use, except in emergency cases. On delivering the set-up to the operator, the tool clerk obtains a check or receipt for it.

When the job is finished the returned basket of tools is inspected. Such tools as require it are sharpened, and then put back into place, ready for the next job. Jigs and other fixtures are put into shape, if such action is necessary, and otherwise the equipment is placed in condition for reissue when called for. The original envelope, containing the blueprint and instructions as to the work, comes back with the

AT Left Is a Section of the Production Control Board, Which Fills the Whole Side of the Room. The vertical bar is the synchronizing measure, as explained in the text



FULL-SIZED Planning Slip—One of Several Thousand on the Control Board. Blue pencil was used for the three items across the top and black pencil for "67" and "B." Ink was used for ".06" and "15948," while the center number was stamped

tools, so that the same items may be reissued when the next lot of the same piece is to be machined.

Check Cards Keep Foremen Posted

Each foreman's office has a set of *Machine Schedule* cards, showing for each machine in his department the schedule for two weeks. Each day is represented by a rectangular space on the card, in which are entered the pertinent facts regarding what is to be done on that machine during that day. These data are the same as were used on the operation planning cards (planning slips) of the production control board, and the symbols are the same as there.

A vertical blue line (here shown about 1 p. m. on Monday) designates the scheduled beginning of a sequence of operations. The scheduled end of the sequence is shown by a vertical red line, here indicated at the close of work on Friday. When each such item is started on the machine a red line is drawn diagonally across the rectangle. When the job has been completed a blue line is drawn on the other diagonal, thus cancelling the rectangle.

Each day a clerk from the production control office checks up on these cards. If he finds a shortage or a failure to live up to schedule he follows this up, determines the cause, and sees that it is corrected or

MACHINE SCHEDULE FROM FEB 20 TO MAR 3 INCLUSIVE						MACHINE NO. 67
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
100 D4141 A ¹ 15948 7658L2 .06						
Monday	Tuesday					

MACHINE SCHEDULE FROM FEB 20 TO MAR 3 INCLUSIVE						MACHINE NO. 83
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
100 D4141 P 15950 7658L2 .01						
Monday	Tuesday					

MACHINE SCHEDULE FROM FEB 20 TO MAR 3 INCLUSIVE						MACHINE NO. 9
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
100 D4141 A ² 15949 7658L2 .10						
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	

SCHEDULES for the Four Jobs Required. The first starts about 1 p.m. Monday and the work progresses until finished, Friday afternoon

LOT RECORD		
THE NASH ENGINEERING CO.		
Symbol	Dwg. No.	7658L2
Description	Shaft Sleeve	
Quantity Started	100	Defective
Date Started	Date Finished	
Partial Deliveries	(Date and Quantity)	
INSP. CHG.	SYMBOL	OPERATION
	A-1	Ream & cut off
	R	Broach
	A-2	Turn & face ends
	P	Stamp & burr
COST DEPARTMENT		
Symbol	Dwg. No.	7658L2
Description	Shaft Sleeve	
Quantity Started	100	Defective
Received	97	In Stock On
Balance		1928
Bin Tag	Storekeeper	a.Q.
Partial Deliveries	(Date and Quantity)	
Inspected and Passed By	a.c.	

LOT IDENTIFICATION CARD		
THE NASH ENGINEERING CO.		
Lot No.	7658L2	Symbol
Quantity in Lot	100	Dwg. No.
Part	Shaft Sleeve	Date
INSP. CHG.	OPERATION	DEPT. NO.
	A-1 Ream & cut off	32A
	R Broach	32
	A-2 Turn & face ends	32
	P Stamp & burr	32

LOT Identification Card, at Left, Guides the Truckload of Pieces from Machine to Machine Until Finished

SET-UP Requisition, Below, Is One of the Four for the Lot. It tells tool room clerk when the tools and jigs are wanted and where

SET-UP REQUISITION			
SET-UP NO.	FURNISH B. P. NO.	DELIVER TO MCH. NO.	DATE WANTED
15948	D-441VC	67	2/20/28
			TIME WANTED 11:00
A-1 Ream & cut off			
D4141VC			
RECEIVED BY OPERATOR NO.		FOREMAN	
341		John Doe.	

STOCK REQUISITION							
THE NASH ENGINEERING CO.							
Form 100-500-1-16-12							
STOREKEEPER:	FEB-7 1928						
Deliver the Following	Rough	Stock on	2/18	1928			
To Employee No.	Mach. No.	67	7658L2				
CHARGE ACCOUNT							
PART	Symbol or Drawing No.	Quantity	Unit Cost	Amount	✓	Inventory	✓
32 ¹ of VC tubing (in bar lengths not to exceed 8') .800	7658L2	1.000	.622	.622			
into process as	D4141VC	100					
	Shaft Sleeve						
Received By B.B. Authorized By A.B.							

LOT Record, Above, Is the Inspection Department's Basis for Inspecting the Work When It Comes in. Then the lower part is detached and sent to the cost department for "costing"

AT Right Is the Stock Requisition Card, on Which the Storekeeper Makes Delivery of the Necessary Stock at the Specified Machine and at the Required Time

properly reported. This relieves the foreman of the necessity to spend his time in following up such details. It leaves him free to exercise his proper functions of supervising the operation of his department, assisting any operator who needs it and generally exercising control over the work.

Each lot of castings or other parts going through in process, except where the pieces are so large that they are handled separately, is contained in a box on a transfer skid. These skids are moved mainly by means of hand-elevating trucks, with capacity of about 5000 lb. A *Lot Identification* card is put in each box, showing the sequence of operations to be performed on the parts in the box.

There may be two or three operations at one machine before the parts are transferred to the next machine. The card shown has the four operations called for by the other cards used here as illustrations of how the system is carried out. As soon, however, as one man has finished his work on such a lot of castings, he signals for a truck man to remove the boxload to the machine where the next operation is to be performed.

Usually six or eight large pumps go through on a single schedule or lot order. Smaller units go in lots of 25 to 50, while the parts which are used to the extent of several in a single pump, or which are interchangeable, or which are in large use through repeated reorders for pumps, go through in lots of 100 to 200 or more.

Two more cards complete the system. The *Stock Requisition* card is practically self-explanatory. It shows the amount of stock required to machine 100 pieces of D-4141 and tells the stock clerk when the material is wanted. The *Lot Record* card is kept in the inspection department until the work is delivered to stock. Then the lower portion of the card is removed and sent to the cost department, properly filled in. It carries data needed in figuring costs. The cost department, by this time, has received the job card, showing the time put in by the operator on this lot.

Examples of Special Work

While routine work is carried through as above, special machines have been purchased from time to time to do specific tasks. About two years ago a Cincinnati duplex miller was put in to mill both faces of a casting at one set-up. This was a new piece of work which previously had not been required.

One two-unit gang drill was set up for drilling both sides of a cast iron tank. The two sides required separate set-ups of drills. Each spindle of the machine is equipped with a multiple-spindle drilling head. Two tanks are drilled at once, one under each head. One tank has its left side drilled, while the other is being drilled on the right side. As soon as this job is completed, the two pieces are interchanged in position so that the opposite sides can be drilled. One man and a helper operate this machine, which has capacity for using 42 drills at once.

One example of work is a bronze shaft or spindle about 18 in. long, turned from a solid, rough bar, with several different diameters at intervals along its length. One man, an expert in non-ferrous work, turns these shafts at the rate of about one an hour. He was reported to have made over 20,000 of them with only one shaft spoiled. Several go-no-go gages are used in checking the different diameters, as all of these shafts have to pass a rigid inspection.

Materials handling in the plant is very simple. It is almost entirely by means of hand-operated elevating trucks, some of which run as high as 7000 lb. in capacity, but most of them are of 5000 lb. A few electric trucks are used, one of which is fitted with a davit-type crane. There is some fairly heavy work handled in the plant, although, for the most

part, the pumps are of relatively small size. Some base plates over 5 ft. square were in process of machining. These are fitted to carry the pump, the motor and a compression tank.

New developments, experimental work, repairs, emergency work of all kinds, so far as possible, are sent through a separate department. The object of this is to avoid disturbing the production schedule on machines engaged in regular routine work. This independent department is equipped with a variety of machines capable of doing practically all the work which may be turned out in the regular departments. For the most part, however, it cannot do the work so economically as it can be done in the special-purpose machines used in regular production. It does, however, furnish a desirable auxiliary and, particularly for developing new lines, it is especially useful.

Employee Morale Important

It frequently happens that a certain machine is not scheduled for work for a day, or perhaps two or three days. This does not mean that the regular operator of that machine is without work. He is transferred to another machine, or even on occasion to another department. This keeps him continually employed, helps morale and incidentally results in the company's having a better trained personnel than would be possible with men each capable of doing a single job only.

Labor turnover is reported to be very small. The policy expressed in the preceding paragraph is partly responsible for this. The men are asked for suggestions, even on jobs which have been studied out and definitely scheduled as a result of several years of experience. Men who have been in the plant for five years or more receive full pay on a two weeks' vacation each summer. Those who have been employed for a shorter period receive proportionate portions of their pay, but all have the regular vacation period.

About 500 men are employed, practically all on day rates. There has been very small change in the total number of employees in the past five years, practically all of the terminations of employment having been made good by new employees almost at once.

National Meeting of Materials Handling Division

Preliminary announcement has been made of a meeting April 23 and 24 at the Hotel Benjamin Franklin, Philadelphia, of the materials handling division of the American Society of Mechanical Engineers. This is the first nation-wide meeting which this division has held. More than 2000 engineers, members of the society, are enrolled in the division, which fact indicates the active interest in this subject.

The tentative program includes a foundry session the first morning, at which will be presented two unusual systems of handling installed in foundries—one steel and the other cast iron. Monday afternoon will be devoted to inspection of various plants in Philadelphia, featuring efficient handling systems. An informal dinner Monday evening will be addressed by speakers of national prominence, covering certain aspects of materials handling.

Tuesday morning a session will be devoted to external handling and transport. Papers will be presented on handling of materials at railroad terminals and marine terminals and on door-to-door distribution. In the afternoon indoor and bulk handling will be considered, including papers on production control as tied up with handling methods. In the evening the session will be devoted to mechanization of coal mines, being a joint session with the National Coal Association and the Philadelphia section of the American Institute of Mining and Metallurgical Engineers.

Mechanical Handling of a Variety of Products Cuts Costs 25 Per Cent

BY BURNHAM FINNEY*

THAT materials handling methods widely adopted by companies concentrating on mass production of a single article, such as an automobile, can be successfully applied by smaller metal-working plants is the experience of Hobart Brothers Co., Troy, Ohio. Even though the company's transportation problem was made intricate by the variety of products manufactured, it has recently introduced a roller and belt conveying system, supplemented by the use of hand-lift trucks, which has cut down costs approximately 25 per cent. Furthermore, it is now possible to turn out considerably more material without adding to the floor space previously occupied.

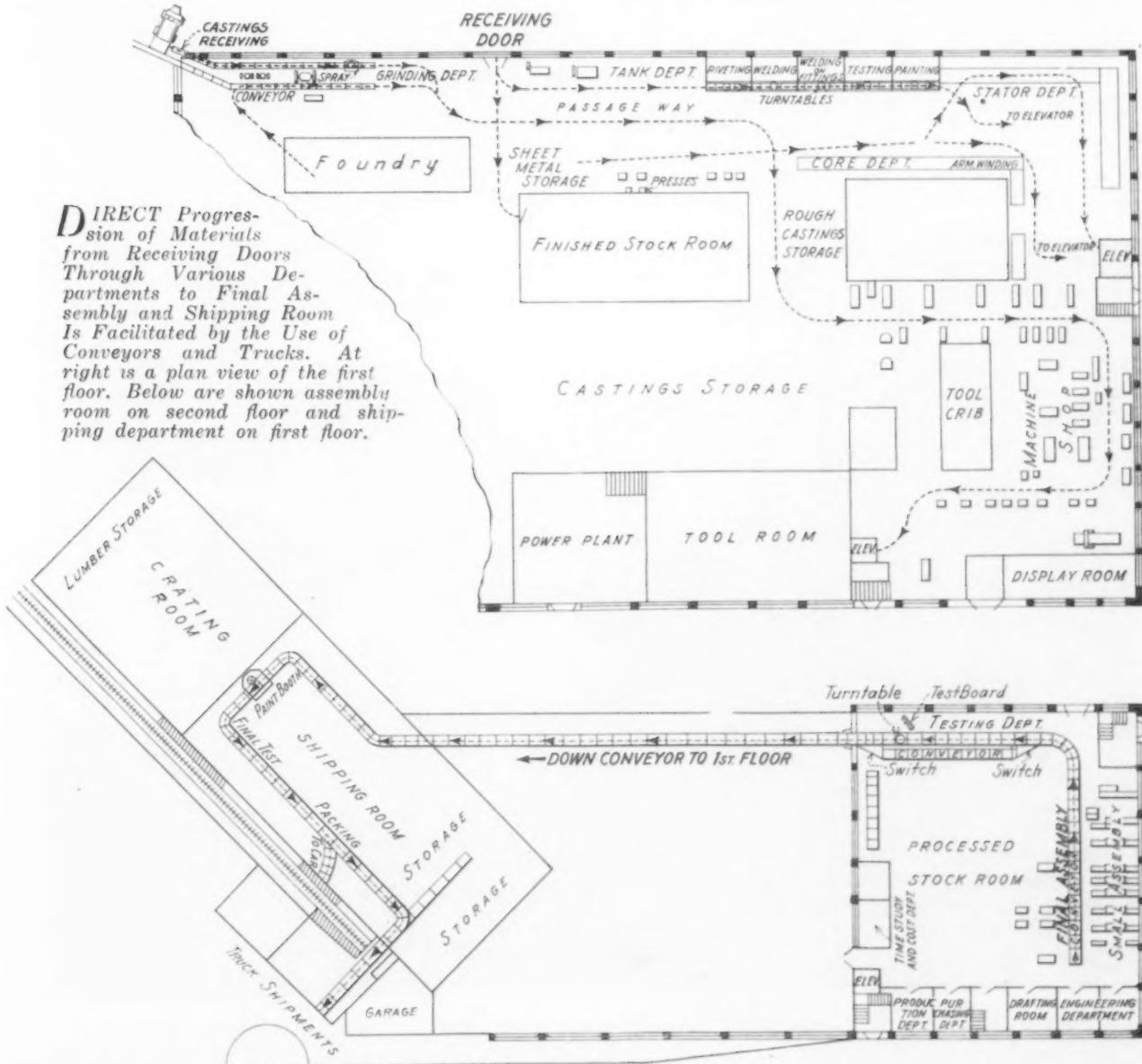
The fact that the company's activities are spread over six different lines of products, some of which bear a close relationship to others, but each of which differs in construction from the other five, has not interfered with the practical working out of a successful mater-

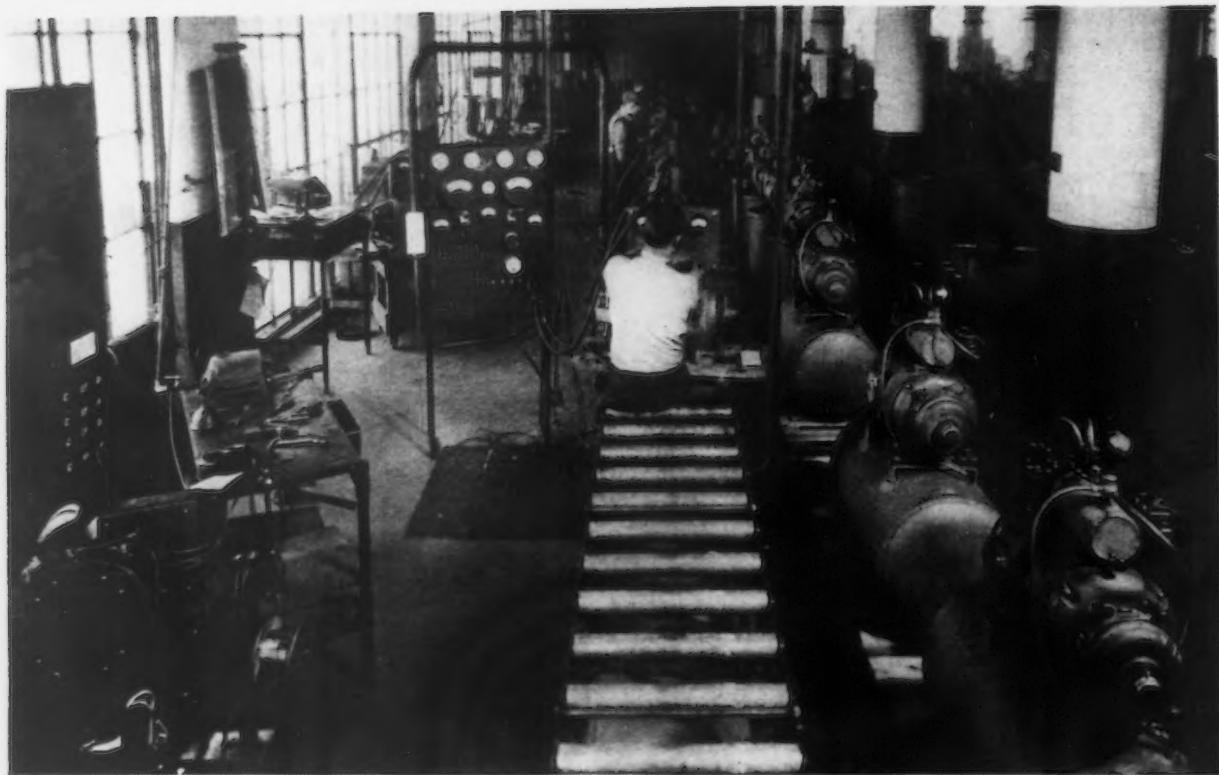
ials handling scheme. Through careful planning it has been possible to arrange departments in consecutive order so that the material in process follows a continuously progressive route from the beginning of assembling operations until the finished machine is placed in freight cars for shipment to customers. Conveyors also have been installed for handling material when it is received.

Conveyor System Expedites Final Assembling

Arrangement of the final assembly department is such that parts are ready at the point of assembly. On one side of the conveyor track are stored the parts which have been processed in the machine shop and which require no sub-assembly work. On the opposite side, running at right angles to the conveyor, are metal cabinets containing small parts, this portion of the plant being known as the small assembly department. It is here that sub-assemblies are made so that parts

*Resident editor THE IRON AGE, Cincinnati.





Separate Conveyors of Different Heights Are Used in the Testing Department. The lower conveyor is used to handle air compressors, as shown. The switchboard (at left) is located so that all instruments are in full view of the tester making final adjustments

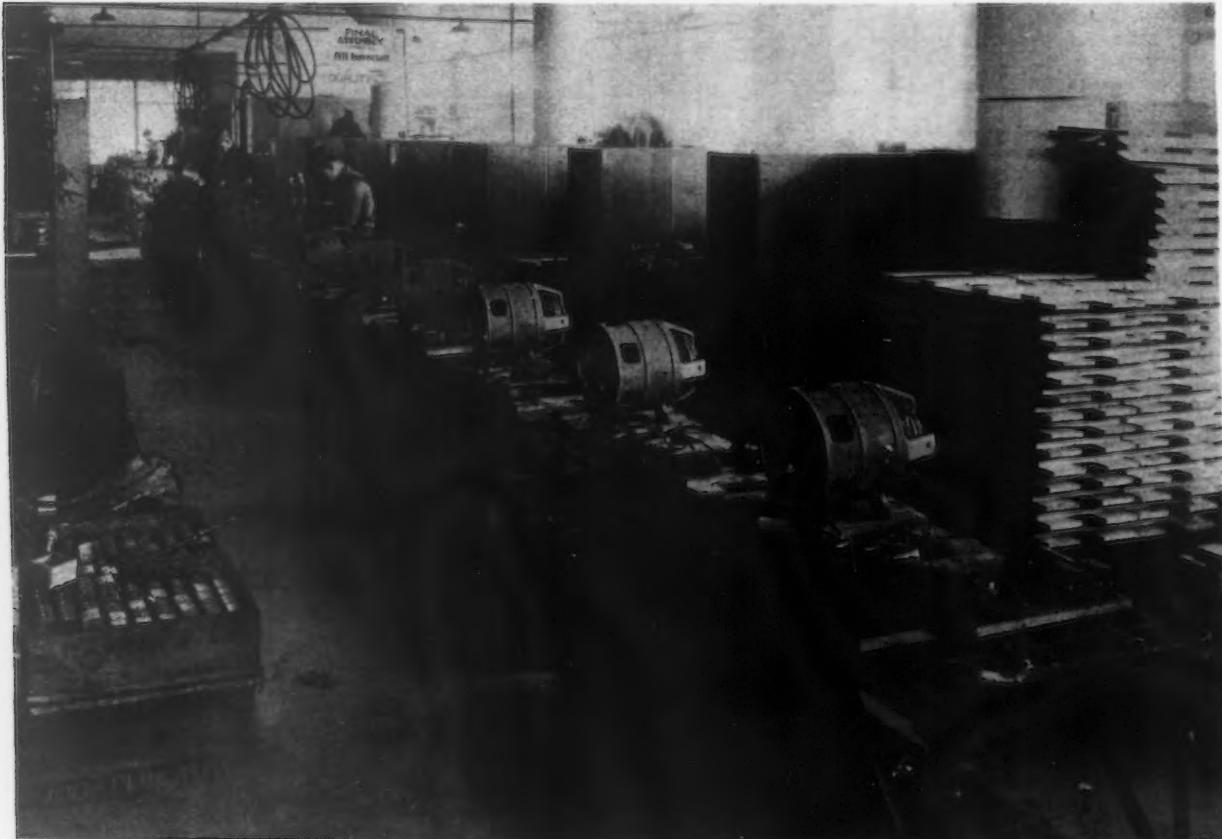
are at the proper place for the final assembly operation.

After the conveyor leaves the assembly department, it branches into two tracks paralleling each other for passage through the testing department. This plan was deemed advisable because of the difference in height of the constant potential battery chargers and of the air compressors manufactured by the company. The former go through the testing department on a

roller conveyor track 24 in. high; the latter pass along on a track only 8 in. high. For the final test a switchboard is so located that all instruments can be seen by the operator who is making adjustments.

Assembled Machines Conveyed to First Floor for Painting

From the testing department the machines are carried on an electrically-driven belt conveyor through a



Conveyor in Final Assembly Department. To the right is the small assembly department in which sub-assemblies are made from parts stored in the metal cabinets. To the left of the conveyor are stored parts requiring no sub-assembly work

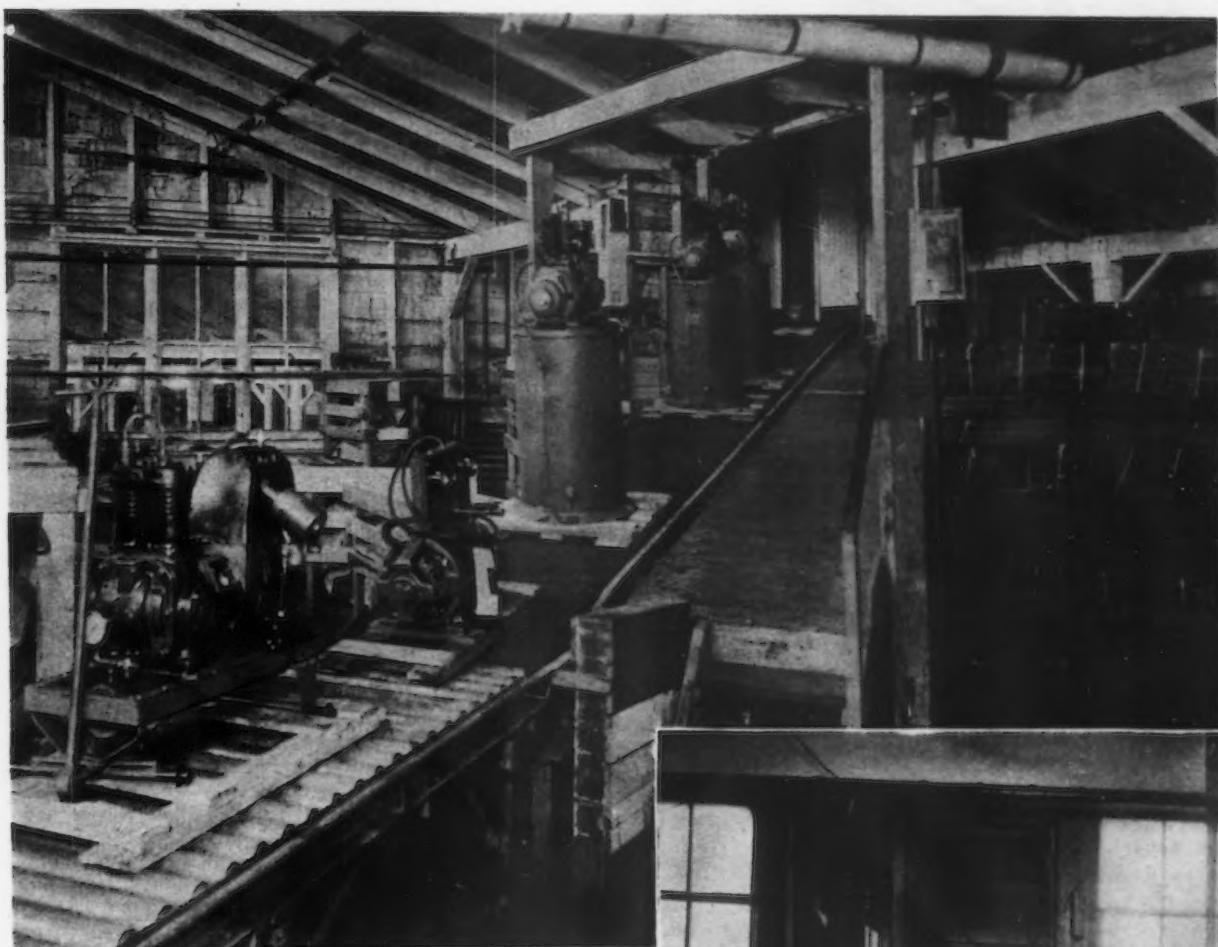
passageway on the roof of a portion of the plant and thence down into the paint department on the first floor. At the end of the passageway the belt conveyor goes down a slight incline at the bottom of which the machines pass on to a roller conveyor. They are moved a short distance to a point where they are sanded previous to passing through the paint spray booth to receive their final coat of paint.

After painting, all machines continue on the roller conveyor to the final test operator who subjects them

which can be moved about easily and quickly as necessity demands.

Conveyors and Trucks Used to Handle Raw Materials

Rough castings are received at the door of the factory from automobile trucks and are transferred to a gravity roller conveyor which takes them to the grinding department. From that point they move in electric lift trucks to the machine shop, where all of the machining operations are performed. The trucks are



As Assembled Products Leave the Testing Department They Are Carried on a Motor-Driven Belt Conveyor through a Covered Passageway Over the Roof of Part of the Plant to the Paint Department

(At Right) Assembled Machines Enter the Paint Department on a Motor-Driven Belt Conveyor, Which Delivers Them to a Roller Conveyor

to a rigid examination. The machines then are packed for shipment by the progressive method. Those to be sent out immediately are taken on the conveyor through a door nearby on to the loading platform; others, which temporarily are to be placed in stock, are diverted by means of a switch in the conveyor track to a siding where they remain until shipped.

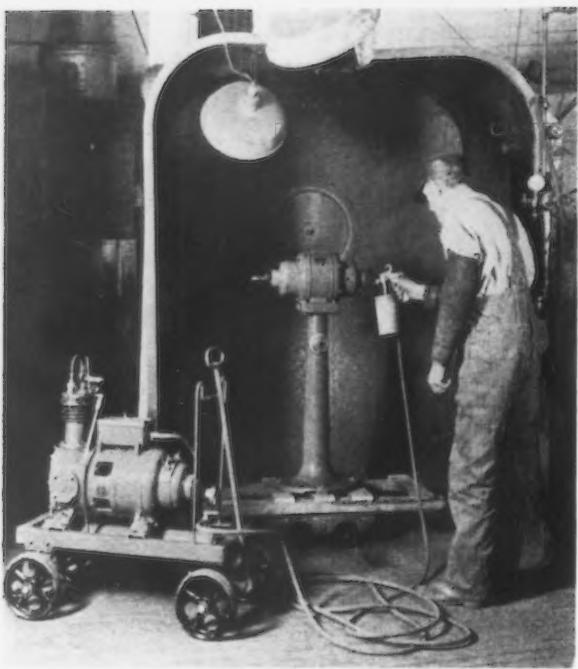
So far as possible, machines of one type are assembled, painted and packed for shipment in groups. For example, 20 air compressors may go down the assembly line in consecutive order, occupying the attention of workmen for 2 hr., before the assembly of a battery charger is begun. When a change is made, 10 battery chargers may be put through. This policy, however, cannot be followed rigidly because it is sometimes desirable to assemble several different kinds of machines simultaneously.

Rush orders are given special handling, the conveyor system giving way in favor of small hand trucks,



placed alongside the operator, so that the time expended by him in handling the castings is minimized. After being machined, the castings are again put into electric lift trucks and are taken by elevator to the processed stock department on the second floor adjacent to the assembly conveyor track.

Stock other than castings is brought into the plant through a second entrance. Steel sheets are stored at one side of a passageway which runs the length of



Rush Orders Are Given Special Handling on Small Hand Trucks

the building. As they are needed they are trucked on a specially designed electric lift truck to the punch presses nearby and thence to the core and the armature-winding departments. Then they go by elevator to the assembly department on the second floor. Some of the sheets are moved by truck to the stator department instead of to the armature-winding department before being transported to the assembly floor.

Compressor Tanks Moved to Assembly Department by Electric Truck

Tanks for air compressors take a course which deviates somewhat from that of other material. In the tank department steel plate stock is sheared to the proper length and is formed into the desired shape. Then the tanks pass successively through the operations of riveting and welding, including the welding of fittings, testing and painting. All welding is done by means of the company's own HB portable electric arc welder. When the tanks are completed, they are transported by electric lift truck to the assembly department.

An intermediate step between machining and assembling castings is filling, sanding and painting.

Products Crated for Shipment Are Moved by Roller Conveyor to the Loading Platform. Machines assembled for stock are held in storage

Castings are taken from the machine shop to the filling and painting room where they are filled and put on a roller conveyor for overnight storage. The next morning they are dry enough to have the plain, curved and straight surfaces sanded by a sanding machine located at the end of the conveyor. After this operation, the castings travel again by conveyor to the finish sanders, which are situated in a separate room specially protected against dust. From this room the castings go by conveyor to a spray booth where they are painted ready for use by the assembly department.

Recently the company has established its own brass foundry, and plans now are being prepared for erecting a gray iron foundry, in which practically all of the castings going into the company's products will be made. In keeping with the general policy followed elsewhere in the plant, the foundry will be equipped with the latest mechanical handling conveniences to effect savings in transportation costs.

Handling Equipment Permits Production of a Complete Machine Every 20 Min.

Since the installation of the conveying system, the company is able to produce a complete machine every 20 min., whereas the output previously had been considerably below this record. In addition, the efficiency of the workmen has been increased, because they have at hand almost without effort on their part the product on which they are working, the conveyors having been built so that the material would be at the most advantageous working level. Moreover, the manufacture of numerous products, totaling 30 sizes and items, has not rendered impractical or costly the operation of roller and belt conveyors operated on much the same principle as those in plants featuring quantity production of a single product.

A mining institute, open to all men interested in any branch of the mining industry will be held at the College of Mines, University of Washington, Seattle, during the week beginning March 5. Prospectors, miners, mine owners, persons interested in metallurgy, investors in mining enterprises, and the public generally are invited to attend. This institute will take the place of the winter mining session which originated at Seattle in 1897 and continued for 28 years.

From the proceeds of an issue of \$11,000,000 6 per cent debenture bonds just made the Pittsburgh Steel Co., \$5,000,000 is to be reserved for the construction of a by-product coke plant. The remainder is to be used to refund outstanding bonds of the company, and the payment of bank loans contracted during the course of extending the properties.



Synchronous Motors for Rolling Mills

Steel Mill Units of Constant Speed—Welded Construction
in Vogue—High Efficiency Is Combined with a
Starting Torque Adequate for Most Mills

BY W. T. BERKSHIRE* AND H. A. WINNE*

DRIVING main rolls is universally recognized as very heavy duty. The loads are high and are applied and relieved suddenly. A motor driving a single stand will run between passes with only 5 to 10 per cent load, due simply to mill friction. As the metal strikes the rolls the load jumps almost instantly to possibly 100 or 150 per cent of normal and is as suddenly reduced when the metal leaves. This happens several times a minute.

If such a drive has been properly selected, several passes on each bloom or billet may require 150 to 175 per cent normal load on the motor. As the load is so intermittent in character, the motor is selected with the idea of permitting some of the passes to come up to these limits, so long as the root-mean-square value of the load is within the normal rating of the motor.

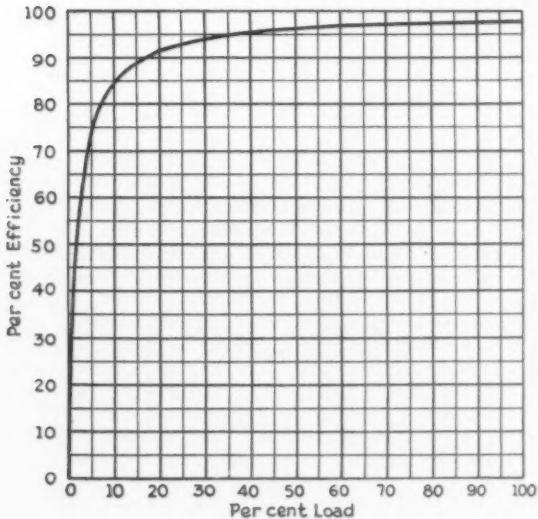
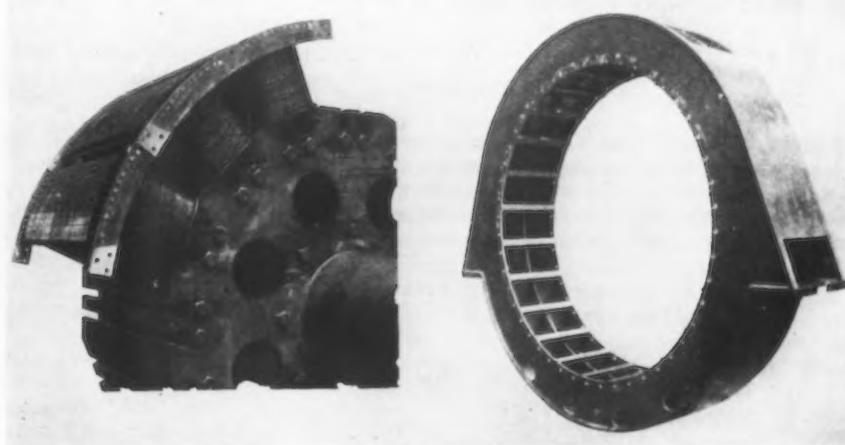
cause their starting characteristics are not so desirable as those of the wound-rotor induction motor. For 100 per cent kva. input the induction motor develops approximately 100 per cent rated torque at starting; whereas the synchronous motor will give from 30 to 60 per cent starting torque, with the same kva. input, at a much lower power factor. However, the torque obtainable from a synchronous motor is ample to start most types of mills and its other advantages make it the logical choice in many cases.

A synchronous motor can be designed for fully as high maximum or pull-out torque as an induction motor. For steel mill service this pull-out torque varies from 225 to 300 per cent of normal full-load running torque. The synchronous motor has the advantage that, for any reduction in applied line voltage, the pull-out torque

ROTOR Assembly (Right) of 6500-Hp. Synchronous Mill Motor for 6600 Volts

Fabricated Stator Frame (Extreme Right) of 16-Pole 4500-Hp. Motor for Bethlehem Steel Co.

Efficiency Characteristic Curve (Below) from a Large 25-Cycle Synchronous Motor



If the heavier passes are of not more than 3 or 4 sec. duration, a flywheel may be utilized to reduce the peak loads on the motor and power system.

Practically the only reason synchronous motors have not been widely used on mill drives in the past is be-

decreases only in direct ratio to the voltage, whereas the torque of an induction motor decreases as the square of the voltage.

Efficiency

One curve shown illustrates the high efficiency obtained from large synchronous motors of 25 cycles. The 60-cycle units show about the same characteristics. The fact that approximately 75 per cent efficiency is obtained at 5 per cent of normal load is noteworthy.

The full load efficiency of synchronous motors for steel mill service varies from 0.5 to 2 per cent more than that of corresponding induction motors. This better efficiency, of course, means some saving in power cost.

Construction

The stator frames of the earlier motors of this type are of cast iron. Those built within the past year and a half, however, are fabricated of steel plates securely welded together, and braced to form an exceedingly strong and rigid structure. To the inner periphery of the frame are welded steel dovetailed keys. The core laminations are held on these keys and clamped between heavy welded steel finger flanges. Air ducts are provided in the core and complete ventilation is further accomplished by the use of air slide wedges.

Because of their size and weight, the stator coils in these large motors are insulated carefully to protect them from mechanical injury. After their assembly in the stator, the end projections are securely laced to

*General Electric Co., Schenectady, N. Y. This is a brief abstract of a paper read Nov. 29 at a regional meeting, in Chicago, of the American Institute of Electrical Engineers.

insulated steel bracing rings supported from the stator frame. The larger machines are supplied with resistance temperature detectors. The stator coils are liberally designed to take care safely of sudden overloads, or the condition where the motor may be required to develop its maximum torque as an induction motor.

The rotor spiders of the machines of small diameter

RELATIVE BASE DIMENSIONS OF THE TWO TYPES OF MOTORS, FOR SEVERAL DIFFERENT RATINGS

Rating	Floor Space in Sq. Ft.		
	Hp.	R.p.m.	Cycles
9,000	107	25	445 (a)
6,500	187	25	272 (b)
5,000	100	60	288 (c)
5,000	240	60	195 (d)
5,000	83	25	282 (e)
1,500	300	25	123 (f)
			143 (m)

(a) 18 ft. x 24 ft. 8 in. (b) 17 ft. 5 in. x 15 ft. 7 in. (c) 13 ft. 2 in. x 21 ft. 11 in. (d) 13 ft. 8 in. x 14 ft. 2 in. (e) 14 ft. 3 in. x 19 ft. 9 in. (f) 10 ft. 10 in. x 11 ft. 8 in. (g) 20 ft. 7 in. x 25 ft. (h) 16 ft. 7 in. x 19 ft. 3 in. (j) 16 ft. 8 in. x 23 ft. 11 in. (k) 14 ft. x 16 ft. (l) 15 ft. x 20 ft. (m) 12 ft. 3 in. x 11 ft. 9 in.

are built up of laminations punched from heavy steel plates. Those of larger diameter are of cast steel. The laminated pole pieces are either dovetailed into the punched rotor or secured to the cast rotor by means of

bolts screwed into steel keys imbedded in the pole pieces.

Field windings are usually of edgewise-wound copper strip. Here again great care is given to the insulation between the turns of the winding, and of the coils as a whole, from the pole pieces and rotor spider. A recent improvement in design consists in the addition of fins to the ends of the field coils, which are made by simply projecting every second or third turn during winding. These fins provide an increased area of radiating surface on the ends of the coils and have proved very effective in reducing the field temperature.

Field of Application

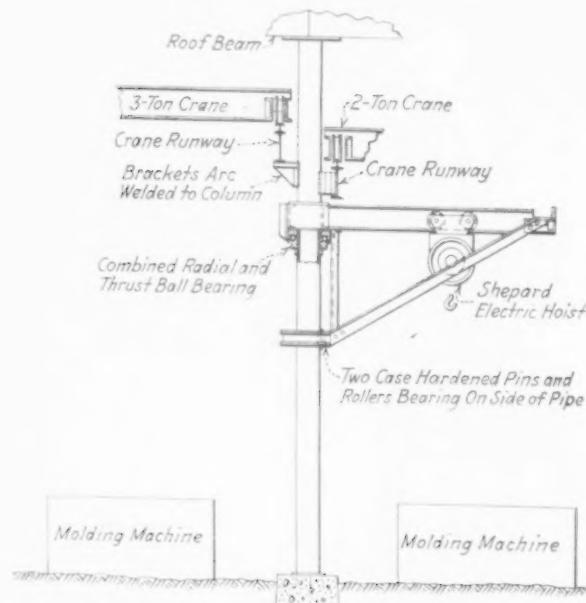
The field of application of the synchronous motor in main roll service is limited to strictly constant speed drives. This eliminates it from consideration on reversing mills, mills requiring flywheels and mills needing adjustable speed.

It is not as a rule advisable to attempt to apply it to any type of mill which may have to be started with metal in the rolls, such as a cold strip mill, nor to cold sheet mills, which have excessively high friction. Such mills may require at starting considerably more torque than is needed to carry their full load at full speed. Unless the motor is sufficiently small in comparison to the power system so that it can be started at full voltage, difficulty may be experienced in getting started and synchronized.

Foundry Jib Crane of Great Flexibility

Design Fitted for Work in Limited Space—Unusual Ball Bearing Arrangement—Electric Welding Employed in Attaching Crane Supports

HANDLING molds mechanically in a limited space is a problem which has been solved by the Fox Furnace Co. (division of American Radiator Co.), Elyria, Ohio, by the erection of a specially designed jib crane which takes the place formerly occupied by a wooden



Jib Crane with 360-Deg. Swing for Handling Loads to and from Molding Machines

building column. This column was replaced by a length of 8-in. double-strong pipe, on which the crane is mounted. The crane swings a complete circle, covering one-half of two bays. It handles molds for heating furnace castings from two molding machines, transferring them from one machine to the other, and also placing them on the foundry floor for pouring.

A feature of the crane, as shown by the drawing, is that the load is taken partly by a combined radial and thrust ball bearing on the column, and directly under the boom, and partly by two roller bearings at the low-

est point on the supporting bracket. In the radial and thrust ball bearing sixty $\frac{1}{2}$ -in. balls are used. The housing is a steel forging. The rollers and pins of the bracket bearing are case-hardened steel. The crane is equipped with a 1-ton Shepard electric hoist and carries a boom load of 2500 lb. It is so designed that, if there should be an overload of the boom, the bracket supporting the boom will fail before the column shows any tendency to buckle.

In addition to the roof load, the crane column supports two overhead crane runways which cover adjacent bays, one carrying a 3-ton traveling crane and the other a 2-ton crane. Brackets supporting the two crane runways are electrically welded to the crane column.

As the bearings assure a smooth action of the crane, little effort is required to move the load. The crane was designed and built by H. A. Jahraus, consulting contracting engineer, 1878 Haldane Road, Cleveland.

Simplified Practice on Forged Tools

As a result of meetings held early in 1924 representatives of the Forged Tool Society and other interested firms in the trade recommended that 300 of the 665 then existing varieties of forged tools be eliminated. Included in this classification are picks, mattocks, hoes, bars, wedges, sledges, and anvil and blacksmith's tools. Last year an effort was made to simplify the eye sizes, and the United States Bureau of Standards has now issued Simplified Practice Recommendation No. 17 giving the details of the sizes and shapes proposed, 10 in number (as compared with approximately 120 in use in the past).

This pamphlet is issued in advance of formal approval by all factors in the industry, and comments or criticisms will be welcomed by the Bureau of Standards.

The Koppers Co., Pittsburgh, will occupy 11 floors of the new 32-story Koppers Building, which is now being erected at Grant Street and Seventh Avenue, that city. Graham, Anderson, Probst & White are architects and E. P. Mellon is consulting architect. Completion is set for Jan. 1, 1929.

Era of Individualism Passing

Iron and Steel Industries of California Are Told That Cooperation and Understanding Between Buyers and Sellers Are Necessary to Prosperity

PRICE-CUTTING is the most vicious practice ever introduced into business," said Charles F. Abbott, executive director American Institute of Steel Construction, in an address on "Wasted Profits" at the fourth annual meeting of the Iron, Steel and Allied Industries of California at Del Monte, Cal., on Feb. 18. "Wherever price-cutting exists," he added, "profits are thrown away. It is purely a case of out-guessing competition, with the price trend always downward. Failure to maintain a one-price policy leads to a deep pit, the bottom of which no organization has ever reached alive.

"Furthermore, the practice is directly contrary to the interests of the buyer. While the law of supply and demand operates it is economically sound for the buyer to try to get the best possible price, but to drive a bargain below the line of a fair profit, good quality and proper service is poor business in the long run. Substitutions, inferior quality and inadequate service logically follow. The buyer suffers and pays in the end a price much greater than one based upon cost plus a fair profit.

"The era of narrow, selfish individualism is passing. We are entering upon a new era of cooperation and cordial understanding between buyer and seller, producer and distributor, and the individual units of our industries. Cooperation between all the elements of an industry is becoming the price of survival."

Steel Industry Needs Intelligent Cooperation

He added that the steel industry is in need of intelligent, aggressive cooperation of a wider scope than is represented by any of its trade organizations now in existence. He advocated work along lines of standardization and simplification, better business methods, better competitive conditions within the industry, protection of the industry against encroachments of competing industries, and broader markets and better profits for all steel products.

Attacking the enormous waste which goes on in the United States, Mr. Abbott said that it is in the field of distribution that the greatest waste prevails. He said that the American Institute of Steel Construction is now working to eliminate some of the wastes that come within the scope of its own field.

Research a Means to Eliminate Waste

"Research has proved one of the most effective means," said Mr. Abbott, "of reducing the tangible causes back of the wholesale squandering of our opportunities for more profitable business. Profits depend largely upon continuous research. Reduced costs, improvement in quality and new uses are among the possibilities.

"The market for steel, like the market for all other products, must be nourished and developed. A survey of the market for steel would unquestionably reveal missed opportunities for the sale of many millions of tons. Neglect of such possibilities adds millions to the wasted profit account.

"Research furnished an essential part of the data required for the standard specification for structural steel for buildings, and the standard specification for fireproofing structural steel buildings, formulated by committees appointed by the American Institute of Steel Construction. The first specification is effecting a saving of about 10 per cent of the amount of steel required for any steel frame building in those cities in which its use has been authorized. The fireproofing specification reduces costs by eliminating the unnecessary dead loads demanded by obsolete fireproofing methods.

"The institute is now cooperating with the manu-

facturers of electric and gas welding devices in a program of research regarding the use of welding in the erection of structural steel. Tests are being conducted in the laboratories of the University of Toronto, and there is reason to believe that it may be possible to bring the costs of steel construction still lower through the use of the welding process.

"It is, of course, scarcely necessary to point out that all research resulting in a reduction of costs tends to promote the wider use of the product, since it places it in a more favorable position in the struggle with competitive materials for the buyer's favor. Lower costs have much the same effect as improvements in quality, or better adaptation to the consumer's preferences.

Steel Being Displaced for Bridges

"Steel is suffering a serious displacement in the field of highway bridge construction. The public is being educated to believe that steel bridges are unsightly, expensive, and lacking in durability. In Pennsylvania it is next to impossible to erect a steel highway bridge, because those in control hold that there are two conditions under which steel is justified: When the span and height are such as to make concrete impracticable, and where there is no way to get the additional funds required for concrete.

"It is strange that such a situation should exist in the State that is the home of the steel industry. Other States enforce restrictions favoring competition, and the number of such States is increasing.

"If the public wants artistic steel bridges, why not build them? The shortest route to a sale is to overcome resistance by meeting the buyer's desires. Why should steel always be painted black or some other unattractive color? Why shouldn't the steel industry initiate research designed to provide the data for the construction of beautiful steel bridges?

Potential Markets for Steel Not Scratched

"As to the development of new uses for steel, steel roadbeds, steel railroad ties and steel for residences provide promising fields for expansion. Steel-frame residences have already passed out of the experimental stage, but we have not yet even scratched the surface of the potential market.

"The yearly increase in the country's population amounts to 2,242,875, or 6145 persons a day. The average number of persons in a family is 4.33; so it is necessary to provide 1419 new homes every 24 hr. This means that 517,935 new homes are needed each year to take care of the increase in population alone. By no means all families live in individual dwellings, but granting the exceptions, think what the proper cultivation of the residence market offers the steel industry in the shape of a new and steady demand for its product!

"An encouraging indication that the steel industry is awakening to the necessity of studying the market is given by the recent organization of a commercial research department by the Colorado Fuel & Iron Co. The future sales activities of this company will be based upon accurate information as to customers, prospective customers, market possibilities, buying influences and economic trends.

Solution of Business Problems Lies in Group Action

"When one stops to consider that the volume of business is as great as, or greater than, the volume in previous years, the absurdity of the present demoralization and lack of profits becomes apparent. The rem-

(Concluded on page 576)

Why Some Drill Rod Steels Fail

Typical Failures Cited—A Particular Case Critically
Analyzed—Good and Poor Structures
—Stresses Involved

BY OSCAR E. HARDER*

DURING the past few years much attention has been paid to the failure of metals by fatigue, or probably the better term is "progressive fatigue." Outstanding examples of such researches are those conducted under the direction of Prof. H. F. Moore, reported in Bulletins 124, 143 and 156, of the engineering experiment station of the University of Illinois, and those by Dr. D. J. McAdam, Jr., of the United States Naval Engineering Experiment Station, Annapolis, Md.

An excellent piece of work, particularly with reference to the mechanism of the progressive fatigue fail-

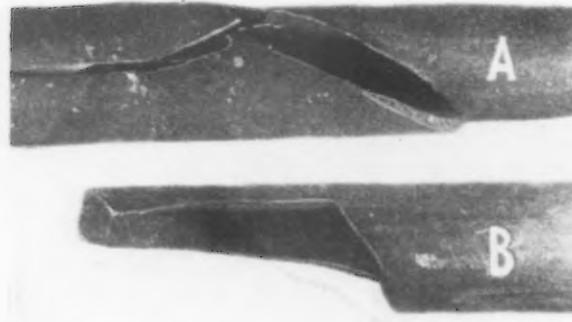


Fig. 1—One of the Most Common Types of Failures in Diamond Drill Rods

ure, is that by Francis F. Lucas, of the Bell Telephone Laboratories, New York, published in the *Transactions of the American Society for Steel Treating*, Vol. XI, page 531 (1926). Professor Moore and Mr. Lucas have paid special attention to the progressive failure through the metal and have given us considerable information with reference to how the failure takes place.

Doctor McAdam, in the *Proceedings of the American Society for Testing Materials* (1926) and R. R. Moore of the engineering division, United States Air Service, at McCook Field, Dayton, Ohio, in the same volume, have paid special attention to the influence of combined corrosion and fatigue stressing.

There are numerous other publications on fatigue of metals, but it is not considered necessary in this brief paper to review all the literature on the subject.

So far as the writer is aware, fatigue failure in diamond drill rod has not been reported in the literature. In the study of the failure of ordinary drill rod by the United States Bureau of Mines, some types of failure were reported which may have been due to progressive fatigue. Recently the writer was called upon to examine and report on a failure in a piece of 1 1/4-in. outside diameter diamond drill rod. This rod had failed while drilling a hole about 2600 ft. deep, and a microscopic examination of the rod indicated that the failure was of the progressive fatigue type.

Typical Failures of Diamond Drill Rod

What is believed to be the most common type of failure in diamond drill rods is shown in Fig. 1, which is about one-half actual size. If the stresses to which

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the rod is subjected are analyzed, there are three important ones:

(1) Torsion due to the rotation during the drilling operation. This stress is repeated but not a repeated reversed stress. The magnitude of the stress may be calculated from ordinary formulas.

(2) Repeated reversed bending, a stress which is encountered in the case of crooked drill holes which are not uncommon.

(3) Stress due to pressure of the cooling water as it is forced through the pipe. This hydrostatic pressure produces two kinds of stresses: Radial stress, which is always a compressive stress, and tangential stress, which is always a tensile stress and is a maximum at the inner surface of the cylinder. As the radius increases this stress approaches the internal pressure, but the maximum stress is always greater than the internal pressure.

The failure under examination was a longitudinal split in the pipe which started near one of the couplings and progressed a distance of some 12 in. A macrograph of a section of the rod at a magnification of 2 1/2 diameters is shown in Fig. 2.

Casual examination revealed little that was unusual, but more careful study showed that, in addition to the one fracture which caused failure, there were four others starting from the inside of the tube and progressing outward in the positions indicated by the numbers in Fig. 2. These cracks were barely visible with

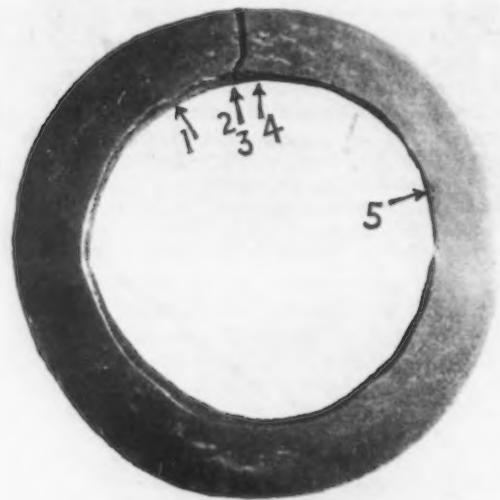


Fig. 2—Macrostructure of Failed Drill Rod, Showing Positions of Fractures. Half original size

the unaided eye, but became very interesting when studied at higher magnifications, as will be discussed later.

The chemical analysis of the drill rod gave the following results:

	Per Cent		Per Cent
C	0.24	S	0.051
Mn	0.48	Si	0.004
P	0.009		

It represents a material of unsatisfactory composition in two particulars. The carbon is only 0.24 per cent, whereas it should have been perhaps 0.35 to 0.40



Fig. 3

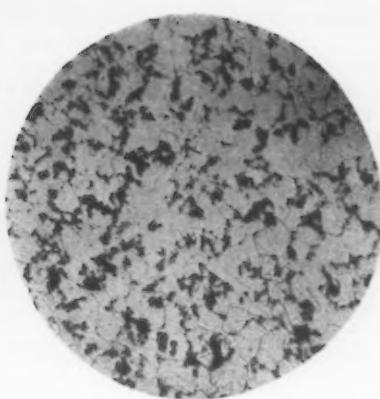


Fig. 4

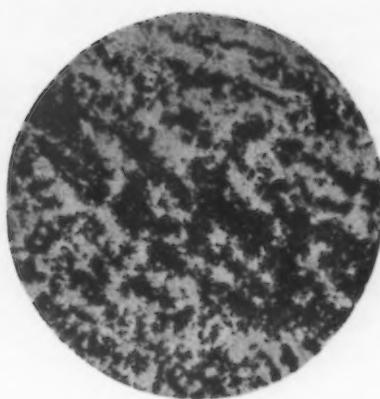


Fig. 5

Fig. 3—Reveals Pronounced Banding of the Structure. Figs. 4 and 5 show uneven distribution of the carbon

per cent. Second, the sulphur is quite high and suggests the possibility of sulphide segregations.

The microscopic examination of the rod indicated two objectionable structures. First, there is pronounced banding of the structure; that is, long bands of ferrite, as illustrated by the light areas in Fig. 3, and these are separated by more or less banded areas of pearlite, shown dark in the figure. Second, there is an uneven distribution of the carbon, as shown in Figs. 4 and 5. Fig. 4 would indicate that this particular part of the drill rod was decarburized to a considerable extent, and Fig. 5 indicates a concentration of the carbide and probably concentration of sonims, or non-metallic inclusions. A concentration of sonims might be attributed to the fact that the steel was not clean, while a decarburized zone such as shown in Fig. 4 might be due to ingotism, or more likely it was due to burning out of the carbon in upsetting the drill rod at the end.

An attempt was made to determine the amount of the segregation by making use of the sulphur print, which indicated that there was considerable segregation of sulphides.

How the Fatigue Fracture Progressed

The various fractures were examined microscopically but before discussing these in detail, it seems to the point to quote from the summary in Mr. Lucas' article previously referred to:

- 1.—Non-metallic inclusions in ingot iron are a potential source of weakness when such metal is subjected to reversed cycles of stress.
- 2.—Iron carbide when occurring as inclusions in ingot iron is not a source of weakness.
- 3.—Non-metallic inclusions seem to be insecurely seated in the metal, and the boundary between the inclusion and the metal is the path often followed by the fatigue crack.
- 4.—The non-metallic inclusions act as "stepping-stones" for the fatigue crack.
- 5.—Grain boundaries do not appear to be a potential source of weakness.

From a study of the photomicrographs of the fractures it appears that the direction of the progress of the fracture has been determined largely by non-metallic inclusions. The observations here would seem to be in complete agreement with the findings of Mr. Lucas. In one case the progress of the fracture was

particularly interesting. First there was a large slag inclusion which came to the surface of the metal and, undoubtedly, constituted the notch effect as regards fatigue resistance. The failure then progressed into the metal and, near the end of the fracture, passed through one of the very badly segregated areas.

Causes of the Failure

Referring to the three stresses encountered in the service of diamond drill rod, it is evident that the maximum stresses due to rotation and bending are at the outside surface of the tube. While one of the stresses, due to the hydrostatic pressure, produces a maximum tensile stress at the inner surface of the tube, it is not believed that this stress is sufficient under operating conditions to cause failure. The failure in this particular rod, however, has apparently started from the inside.

There are two seemingly plausible explanations for this phenomenon. If, in the manufacture of the drill rod, the inside was left rough and striated in a longitudinal direction, the notch effect may have been sufficient to cause the failure to start on the inside of the drill rod even though the stresses were lower than on the outside. Second, it is obvious that the tube is badly corroded inside and the failure may have been the result of a combination of the notch effect and corrosion fatigue such as had been reported by Doctor McAdam and R. R. Moore.

The low carbon content of this drill rod, and therefore its lower physical properties, would undoubtedly lower its endurance limits, and it might be expected to fail at lower fiber stress than drill rod of higher carbon content. As previously pointed out, the structure is banded and furthermore there is segregation and a considerable amount of non-metallic inclusions. It should also be pointed out that the wall thickness is non-uniform, being about 0.050 to 0.060 in. thinner at the point where the failure occurred than on the other side.

Structure of Satisfactory Material

It should be said, by way of explanation, that this particular drill rod represents stock which had been on hand for a long period of time, stock which was probably purchased about the close of the war when various industries were buying the steel they could get

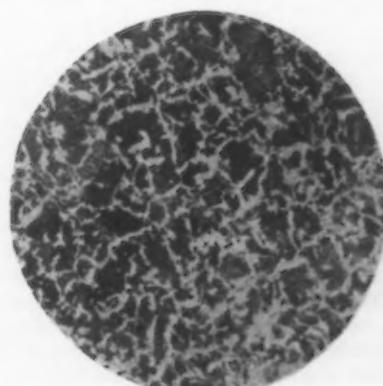


Fig. 6



Fig. 7

Figs. 6 and 7—Photomicrographs of Drill Rod Steels Which Are Considered Satisfactory Material at the Present Time

regardless of the fact that it did not completely satisfy their specifications.

Photomicrographs of drill rod samples which are considered satisfactory material at the present time are shown in Figs. 6 and 7. These represent steel containing about 0.40 per cent carbon, and a macroetch, as well as these photomicrographs, showed a homogeneous structure and general freedom from sonims.

Summary and Conclusions

1.—What appears to be a typical progressive fatigue failure in diamond drill rod has been noted.

2.—The cracks have been observed to start from the inside of the pipe and to progress outward, contrary to what would be expected from the intensities of the fiber stresses.

3.—A combination of notch effect and corrosion has been suggested as the cause of the position of the cracks.

4.—It has been indicated that the quality of the steel as revealed by the microstructure has an important bearing in progressive fatigue failures.

5.—The importance of care in handling stocks of raw materials and inspection has been indicated.

Magnetic Alloys Named and Defined

Several Important Brands in Common Use Described in Terms of Properties and Composition

IT has lately become the custom to christen newly developed alloys with names chosen with the idea of indicating something of the nature of the material. Many of these names have already become familiar, but in the field of magnetic materials there seems yet to be some confusion in many cases as to the real meaning. For example, there is uncertainty on the part of some with regard to the alloy which has been called "permalloy." Is it good material for permanent magnets or not? With this situation in mind the following brief description of some of the more recently produced alloys may be of interest and value.

Permalloy.—So named because of its high permeability, this alloy, which is 78 per cent nickel and 22 per cent iron, has a maximum permeability, when properly heat treated, more than 50 times as great as that of pure iron. This remarkably high permeability is exhibited under the influence of very weak magnetizing forces and consequently the material is exceedingly valuable in the construction of the magnetic cores of apparatus which operate with feeble electric currents. On account of its relatively low saturation value (about one-half that of pure iron), its usefulness is restricted to applications where the magnetizing forces are very small, as they are in most types of communication apparatus. One of the most interesting applications is its use in the loading of submarine cables. Permalloy has very little magnetic hysteresis and consequently is not suitable for permanent magnets.

Hipernick.—This "high-permeability-nickel" alloy has equal amounts of nickel and iron. It does not give as high permeability as permalloy but has an initial permeability, under suitable heat treatment, more than ten times that of pure iron with a maximum permeability upward of 50,000, which is roughly 25 times that of pure iron. Its principal advantage lies in its less sensitiveness to the effect of mechanical strain and its response to the ordinary method of heat treatment by slow cooling. It has found its main use in the cores of audio frequency transformers and current transformers.

Copernick.—This does not contain copper as the name might seem to imply, but has the same chemical composition as hipernick. By means of a different heat treatment, however, somewhat different magnetic properties are obtained. The principal characteristic is a considerable range of flux density in which the permeability has little variation, hence its name "constant-permeability-nickel." This condition is obtained at some sacrifice of initial and maximum permeability, but both are considerably higher than for the best silicon transformer steel, being of the order of 1200 and 15,000 respectively according to the heat treatment.

"A" Metal.—This is a high-frequency induction furnace product consisting of iron, nickel, and copper. The copper content is 6 to 8 per cent. It was developed primarily for use in the cores of audio frequency transformers and similar applications. It has a range of inductions in the neighborhood of 4000 gauss in which there is little variation in permeability and so gives very little distortion, due to the direct current component usually present in audio frequency transformers.

Thermalloy.—A temperature-sensitive alloy of approximately 66.5 per cent nickel, 30 per cent copper, and 2 per cent iron. The permeability falls off with increase in temperature in a nearly linear manner. By varying the composition and heat treatment, almost any desired characteristics can be obtained. The material has been successfully used for magnetic shunts in watt-hour meters for the compensation of errors due to variations in temperature.

K. S. Magnetic Steel.—This permanent magnet steel was developed by the Japanese metallurgist Kotaro Honda and named by him in honor of Baron S. Sumimoto whose financial support made possible the investigation leading to its discovery. By means of the addition of a substantial percentage of cobalt to magnet steel of the ordinary composition, a steel was produced having remarkable magnetic properties. Without sacrifice of residual induction, this alloy gives a coercive force more than three times as great as that of the best practical magnet steels previously produced. With proper attention to design, it is possible to reduce the amount of steel required for a given purpose to about one-third of that required for the older types of magnet steel. It is also possible to make stable magnets of forms not practicable with the steels previously available. On account of the high cost of cobalt and somewhat more expensive methods of production, K.S. magnetic steel is not generally an economical material, however, and its use is justified only where considerations of weight or space are of paramount importance.

Cobaltcrom.—As the name implies, the distinguishing ingredients of this permanent magnet steel are cobalt and chromium. The percentage of cobalt is generally lower than in the K.S. magnetic steel and the chromium content is higher. These steels are produced in England and come in two grades "Special" and "Double Special." The residual induction is somewhat lower than for the ordinary magnet steels, but the coercive force values compare favorably with the K.S. magnetic steel described above. A rather complicated heat treatment is specified for these steels, but with care very good results can be obtained.

Permanite.—This is a permanent magnet steel having properties intermediate between those of cobaltcrom and the ordinary magnet steels in common use. It might be called a cobalt-chrome-tungsten alloy. The coercive force is about 50 per cent higher than ordinary tungsten or chromium magnet steels and the residual induction is about the same. The same statements with regard to design and cost that apply to the other types of cobalt magnet steels are applicable to permanite.

Nomag.—As its name would indicate, this material is hardly a magnetic alloy. It is a practically non-magnetic cast iron which owes its non-magnetic characteristic to the presence of about 6 per cent of manganese. Machinability is obtained by the addition of about 9 per cent of nickel. It has a high electrical resistivity and is useful where the ordinary mechanical properties of cast iron are desired but where a magnetic material would be objectionable.

American Steel Treaters in Canada

Winter Sports and Technical Programs Divide Attention of Members



Uses of Alloy Steels and Heat-Treatment Problems Considered

TECHNICAL programs held by the American Society for Steel Treating in Montreal last week (Feb. 16 and 17) warranted a better attendance from both Canada and the States. For quality of original papers and vivacity of discussion the meetings were the equal of any held by the society at its general meetings.

About 100 members from New England, the North Atlantic and Central States were entertained by the local chapter with a full program of sleigh riding, tobogganing, ski jumping and professional hockey. These winter sports, as well as visits to various resorts, made the occasion one long to be remembered by those from milder and dryer climates.

Four manufacturing plants held open house. Canadian Steel Foundries, Canadian Vickers, Dominion Engineering Works and Dominion Bridge Co. all seemed to be working near capacity. The general impression a casual visitor retains of these operations is that much more attention to small details is given by both management and workmen, the sum of which undoubtedly contributes to high quality in the output. Really notable machinery and structures are being constructed in these modern plants.

Chromium and Nickel Steels

MOST of the papers had to do with alloy steels and the adaptability of various alloys for practical purposes. Space prevents a full abstract of all those presented. Several had to do with chromium and nickel analyses.

Cast Chrome Irons

V. T. Malcolm, metallurgical engineer Chapman Valve Mfg. Co., Indian Orchard, Mass., presented a paper on "Cast Chrome-Irons" which mentioned the foundry difficulties and the requirements of the finished castings. He said that cast chrome-irons are really corrosion-resisting mild steels, and are essentially different from stainless steels by having lower carbon. (In discussion it was mentioned that castings also carry considerably more silicon; a successful analysis is 0.15 per cent carbon, 17 per cent chromium. E. C. Bain said that he would judge that carbon would

have to be less than 0.45 per cent carbon if the chromium was 18 per cent, to insure that the material would resist corrosion.) Such castings, after annealing at about 1550 deg. Fahr., are soft and malleable, and machine without great difficulty. Physical properties are given in the accompanying table.

In melting, extreme care is necessary to avoid oxide inclusions. Good clean scrap, reducing conditions during melting, thorough refining and degasifying are all necessary. Highest skill in molding and temperature control during pouring are required. Operations must be adjusted so that the alloy will not burn or cut into the sand, so that it will shrink no more than a controllable amount, clean easily and solidify into a dense fine-grained metal with carbides uniformly and finely dispersed. In order to remove iron-rich scale or adhering dirt it is customary to pickle castings in hydrochloric acid, wash them, and then immerse in concentrated nitric acid. This produces a surface film which is passive to atmospheric corrosion.

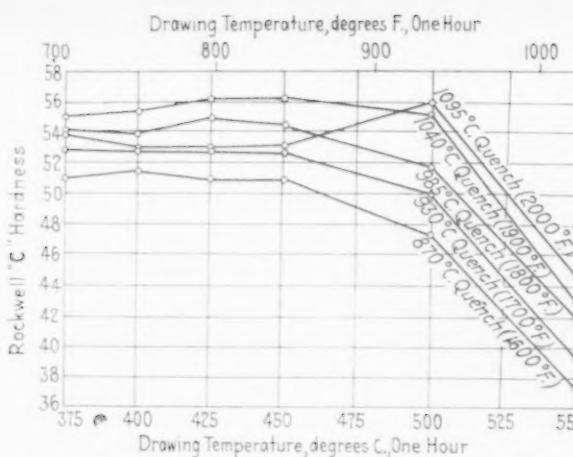
During the discussion it was brought out that English metallurgists are more successful in making high-temperature erosion and corrosion-resisting castings than are the Americans. Nickel is added to some analyses when making castings up to 1000 lb. in weight, and in order to reduce the necessity of heat treating parts of non-uniform cross-section. If carbon can be kept low enough so that the chrome-iron casting is exclusively a solid solution of ferrite plus chromium plus carbon, then the only things which heat treatment can do, other than relieve internal strain, is to cause grain growth (which is especially active when silicon is up) or reduce coring.

N. L. Mochel of the Westinghouse Electric & Mfg. Co., Philadelphia, said that at present not all the commercial requirements can be met simultaneously by chromium or chromium-nickel castings. High-pressure steam fittings especially give trouble; nearly all machined castings are comparatively porous. Complexity of form seems also to increase enormously the foundry difficulties. Some striking successes have been accomplished, however. He mentioned particularly the fact that his organization has a large tank made of a chrome-iron casting which has held concentrated nitric acid for three years without damage.

Reasons Why Stainless Steel Resists Rust

Edgar C. Bain of the Union Carbide and Carbon Research Laboratories presented a paper entitled "X-Rays and the Constituents of Stainless Steel." A detailed study was made of a thin commercial sheet analyzing as follows: Cr 17.4, C 0.77, Mn 0.43, Si 0.25 and Ni 0.24 per cent. A series of test pieces, systematically quenched and drawn, gave hardness and corrosion tests as shown in the diagrams. (Loss of weight

Ultimate strength	100,000 lb. per sq. in.
Yield point	75,000 lb. per sq. in.
Maximum allowable working stress at 1000 deg. Fahr.	12,000 lb. per sq. in.
Melting point	2,750 deg. Fahr.
Scaling point (maximum temperature for continuous operation)	1,600 deg. Fahr.



Hardness of Quenched Stainless Steel Is Not Much Affected Until Drawn Above 500 Deg. C.

High Temperature Quench and Low Temperature Draw Give Maximum Resistance to Corrosion (At Right)

in circulating weak nitric acid is an evaluation of atmospheric corrosion). A distinct secondary hardness developed by drawing a 1095 deg. C. quench to 500 deg. C. indicates that some austenite is retained after this high quench. If this steel is to have good rust resistance it must have a high quench and a relatively low draw.

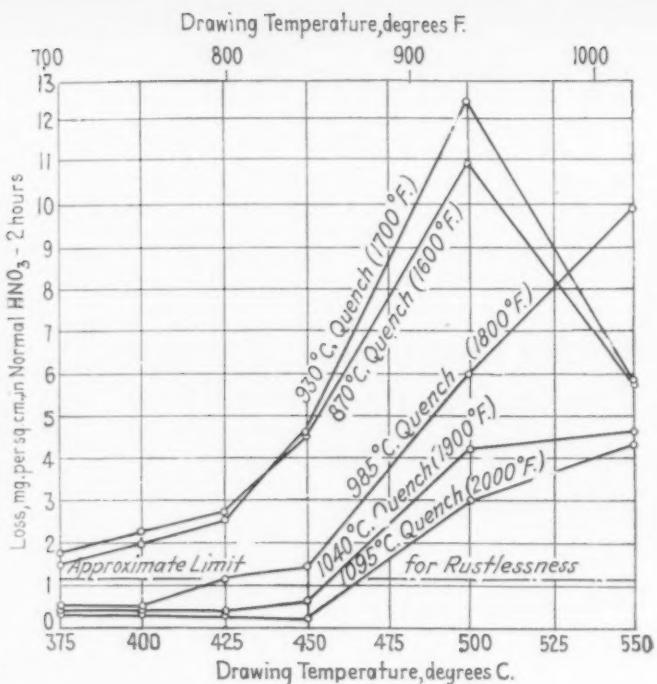
Systematic X-ray investigations were also made. The paper shows clearly how to interpret these diffraction patterns. In all instances, ferrite "doublets" appeared at the 550 deg. C. draw, which Mr. Bain interpreted to indicate the sudden disappearance of martensite and internal strain. Patterns of residual carbide were distinctly shown in all specimens quenched from 1040 deg. C. and lower, which did not change in appearance after the various draws, this indicating that they did not materially increase in number or effective size. The steel quenched from 1040 deg. C. had faint austenitic lines; the one quenched from 1095 deg. C. had the austenite pattern as well marked as the ferrite pattern.

After a brief account of the constitution of the rustless irons, stainless steels and chrome irons, Mr. Bain advanced the following considerations to account for the observed phenomena:

1. That 12.5 atomic per cent chromium in solid solution in either alpha iron or gamma iron (whether as ferrite, austenite or some intermediate phase) is sufficient to resist oxidation by atmosphere or acid exposure.
2. That in annealed or excessively drawn steels practically all the carbon is held in complex carbides, containing a higher Cr:Fe ratio than the surrounding ferrite.
3. That this may cause the ferrite immediately adjacent to have a chromium content less than 12.5 atomic per cent, and readily rust, despite the fact that the chemical analysis of the entire sample may be correct.
4. Heating and quenching dissolves these carbides, but care must be taken to heat hot enough and long enough, and to avoid high temperings (which reforms the carbide particles).
5. If chromium is high enough by a safe margin, the steel or iron is rustless in all conditions.

Toughness of Chromium-Nickel Steel

In order to determine whether an S.A.E. 3265 steel is better than the more usual 3250, B. F. Shepherd, as-



sistant metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J., made some tests on the following steels:

S.A.E. No. 3250 Per Cent	Low- Nickel Per Cent	High- Carbon Per Cent
Carbon	0.50	0.51
Manganese	0.40	0.47
Nickel	2.35	1.85
Chromium	0.95	1.00

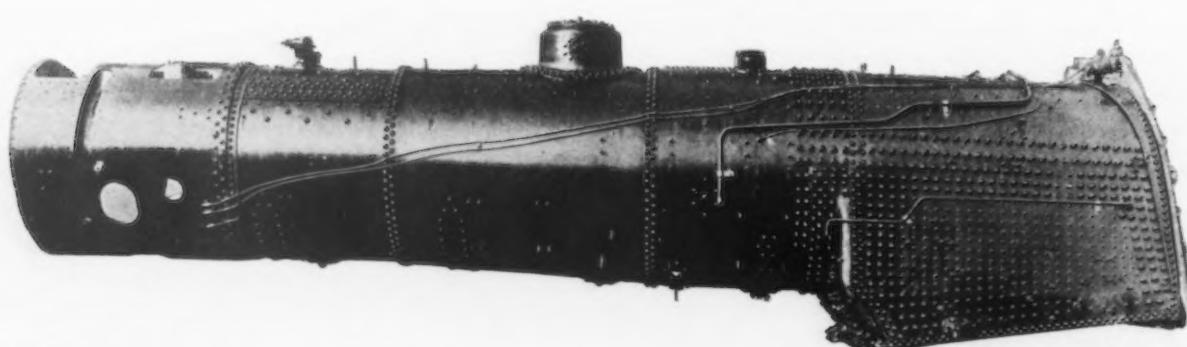
Silicon in these steels was 0.25, sulphur 0.013 and phosphorus 0.01 per cent.

Izod, tensile and hardness tests are contained in his paper entitled "A Note on the Hardness and Impact Resistance of Chromium-Nickel Steel," and are summarized in the table. Annealed bars were rough ground to 0.015 in. of size, hardened and finish ground to shape. Izod bars were then notched by grinding with a 45-deg. notch, 1/64 in. deep, 0.01-in. radius at the bottom. Results were consistent, the average spread in the groups of three being three units, or 13 per cent of the impact value.

Oil quenching was done from lead baths. Tempering was done in an electric furnace for 2.5 hr. Bars either quenched, or quenched and drawn, at 300 deg. Fahr. broke under the head, thus illustrating the fact that "hard" parts fail by concentrated local stresses. The unyielding character of the steel prevents that slight local distortion and plastic flow which would uniformly distribute the load. When quenched from 1450 deg. and drawn at 550 the following results were obtained:

S.A.E. 3250	Low-Nickel	High-Carbon
Proportional limit..	233,750	over 200,000
Ultimate strength..	264,500	275,000
Elongation in 2 in.	8.0	7.5
Reduction in area..	22.5	24.0
		17.0

It can be seen that the standard S.A.E. 3250 is not improved by increasing the carbon. Hardness and



Locomotive Boiler Made with Nickel Steel Shell, Firebox, Stays and Tubes by Canadian Pacific Railway Co.

strength are no better; ductility and impact are much inferior.

Impact and Hardness Tests on Chromium-Nickel Steels

Heat Treatment	S.A.E. 3250		Low-Nickel		High-Carbon	
	Izod Rockwell	Rockwell	Izod Rockwell	Rockwell	Izod Rockwell	Rockwell
Q. 1450	15.3	56	10.0	57	7.5	59
Q. 1450; D. 300	29.0	56	17.3	56	12.7	57
Q. 1450; D. 550	29.0	50	21.3	50	16.3	50
Q. 1500	14.3	56	7.3	58	8.7	59
Q. 1500; D. 300	28.3	56	20.7	56	6.3	58
Q. 1500; D. 550	26.3	50	16.0	50	16.0	52

Nickel Steel in Boiler Construction

"Alloy Steel for Boiler Construction" was discussed by Charles McKnight of International Nickel Co., New York. While nickel steel boilers were installed in the United States cruiser Chicago, built many years ago, and in one locomotive built by the Baldwin Locomotive Works in 1904, the Canadian Pacific Railway Co. may be regarded as pioneering when in 1926 it built 44 locomotives with nickel steel boilers and fire-

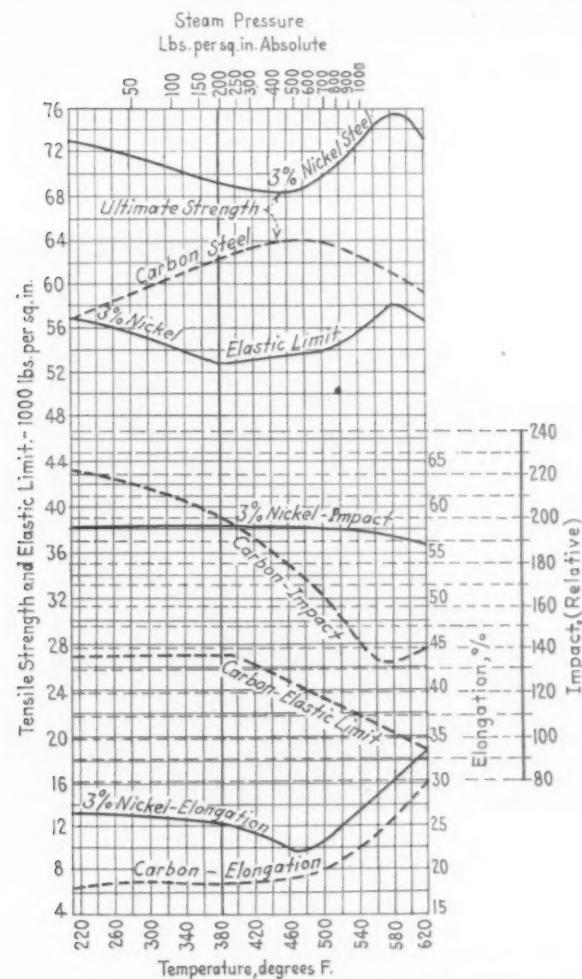


Fig. 1—Comparison of Physical Properties of Carbon and Nickel Steel at High Temperatures

boxes. By this means the steam pressure was increased 25 per cent (from 200 to 250 lb.) without increasing the thickness of the plate. Characteristics of the 3 per cent nickel steel used are shown in the table. Cold bend tests show it to have about the same ductility as carbon steel.

Fig. 1 gives physical properties at elevated temperatures, as determined by P. Goerens.* While this investigation is reliable the results are not comparable with others by investigators using different test pieces, and steels with different histories. It is especially necessary for boiler steel to cool slowly after rolling—the usual passes through leveling rolls are in effect a quenching.

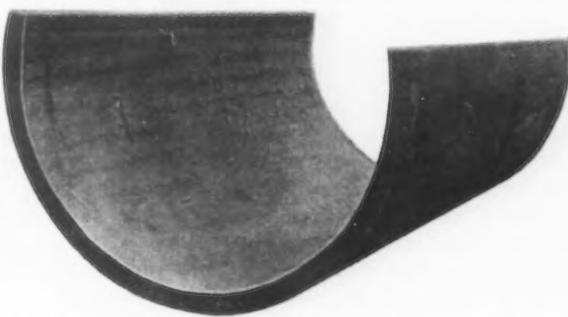
Manufacturing procedure is as follows: A well killed steel is cast in big end-up molds with hot tops.

*Paper entitled "Die Kesselbaustoffe," in *Zeitschrift des Vereines Deutscher Ingenieure*, Jan. 19, 1924.

†Transactions, American Society for Steel Treating, November, 1927.

Crop 40 per cent to avoid pipe. Chip all surface defects. Heat slowly, and conduct rolling so as to insure best possible surface, and finish at a good red heat. Pile hot plates promptly, one on top of another, and cover pile with sand. Plates should require 8 hr. to come to black heat.

In the boiler shop no special difficulties are met. Either carbon steel or nickel steel rivets can be used. Welding by either gas or arc process is perfectly feasible when using nickel steel welding rod. Mr. McKnight also feels that the increased resistance to corrosion



Two-Inch Nickel Steel Plate for Babcock & Wilcox High Pressure Boiler

conferred by the nickel content, and the high elastic limit of the material, will minimize corrosion cracking so troublesome in the highly stressed regions between stayholes.

Nickel steel staybolts were described in *THE IRON AGE*, Dec. 29, 1927, page 1785. Low-carbon tubes with about 2 per cent nickel have been in extensive naval use for 25 years, and outlast carbon tubes many times. They are also successful for stationary boilers, wherever water conditions are bad. This analysis has the property of developing a glossy surface to which scale does not adhere.

Properties of Nickel Steel and Carbon Steel Boiler Plate

Analysis:	Nickel Steel		Carbon Steel
	Specified	Average of 523 Tests	Average of 385 Tests
Carbon	0.20% max.	0.163%	0.193%
Manganese	0.40 to 0.80%	0.557%	0.401%
Phosphorus	0.045% max.	0.021%	0.022%
Sulphur	0.045% max.	0.029%	0.033%
Silicon	0.203%
Nickel	2.75 to 3.25%	2.960%
Physical Properties:			
Ultimate	70,000 lb. per sq. in. min.	77,880 lb. per sq. in.	59,200 lb. per sq. in.
Yield point	0.5 ultimate	47,550 lb. per sq. in.	36,200 lb. per sq. in.
Elong. in 8 in.	20% min.	26.33	28.64
Reduction	50%	54.15%
Izod impact	63.4

Heat Treatment and Tool Steel

ANOTHER group of papers considered methods of heat treatment, microscopic examination and the effect of impurities on high speed tool steel.

Putting Internal Stresses to Work

Internal stresses are usually the designer's bugaboo, but W. J. Merten of Westinghouse Electric & Mfg. Co., East Pittsburgh, proposes to put them to good use. Langenberg's methods of increasing the strength of gun tubes by expanding them hydraulically rest upon the same principle. G. M. Eaton† also has shown that coiled springs may be much improved by quenching in an internal spray.

In high-speed turbine shafts and disks the centrifugal forces induce large stresses in tension. If such pieces are quenched so that the periphery cools first, the resulting internal stresses are in tension, which obviously reduces the factor of safety in the design. Mr. Merten calls attention to the fact that compressive stresses of from 5000 to 15,000 lb. per sq. in. may be placed in hollow forged or bored disks as follows: Mount the disk before heating on a mandrel, and when ready to quench place the mandrel on suitable rollers and spin the disk rapidly, meanwhile spraying pressure water on the center of the disk. Subsequent tempering

relieves these quenching stresses somewhat, but never entirely, as evidenced by slight changes in dimension after machining. At any rate, those that are left are in such a disposition as to increase the margin of safety during operation, rather than the opposite.

In presenting his paper, Mr. Merten pointed out that the great difficulty in heat-treating such a forging as a complete rotor for a big turbo generator led them to manufacture it of a series of disks, placed side by side and held together by bolts extending from one bearing boss to the other. These disks are about 20 in. thick, 56 in. in diameter, have an 8-in. bore, and weigh 7500 lb. each. By means of the quenching described, and this method of sectional construction, the slots cut in the assembled rotor could be deepened so much that the extra coils thus provided for increased the electrical rating of the machine from 50 to 75 per cent. A. B. Kinzel also said that this same principle was utilized by saw smiths, who were in the habit of quenching the rim of high-speed circular saws, then smithing the center to put compression on the circumference. Studies showed that these induced stresses amounted to 18,000 lb. per square inch; machines have also been developed to perform this work under close control.

Case Hardening with Ammonia

Vanadium steel case hardens excellently in ammonia at 950 deg. Fahr., according to results reported by A. B. Kinzel, of Union Carbide and Carbon Research Laboratories, Long Island City, N. Y. Aluminum alloy steels for this purpose have already been developed by Fry, in Germany,* and the process of low-temperature nitrification without scaling or distortion is commercially attractive.

Ordinary calorized steel will not harden usefully in ammonia, because the aluminum concentration at the surface is too high; a long, high-temperature anneal after calorizing will diffuse aluminum inward to the necessary degree, but the double process is undesirable; it also scales the surface.

A short, low-temperature calorizing treatment on carbon steel or chromium steel at 1020 deg. Fahr. for 2 hr. gave a good case after nitrification. No embrittling resulted; the bar before treatment had Izod impact of 80, and 78 afterward.

Chromium, silicon, manganese, tungsten and titanium steels are not so good as aluminum for the process. Zirconium steels appear erratic.

A series of 0.06 per cent carbon steels alloyed with vanadium were tried. With vanadium above 0.5 per cent a nitrogen case with maximum hardness (67 Rockwell "C") was secured. More vanadium is required as the carbon increases; it seems that the ferrite must contain at least 0.4 per cent vanadium. Vanadium may be economized by adding chromium, manganese or silicon, or combinations of these, to the higher carbon steels, which alloys replace some vanadium in the complex carbide. One per cent plain carbon steels may be successfully treated after packing in powdered ferrovanadium and heating as follows:

Stage	Gas	Atmosphere	Temperature	Time
Decarburize	Hydrogen		1290 deg. Fahr.	30 min.
Vanadiumize	Nitrogen		1690 deg. Fahr.	2 hr.
Nitrogenize	Ammonia		950 deg. Fahr.	15 hr.

If the high-carbon steel originally contained 0.5 per cent vanadium, the middle stage can be omitted.

H. A. De Fries, metallurgist Ludlum Steel Co., Watervliet, N. Y., described recent developments in aluminum steels for nitride case hardening. Straight aluminum, or chromium-aluminum steels, with or without nickel, will produce very hard surfaces, but all of them are subject to "Krupp Krankheit" or brittleness after heating at moderate temperatures. For instance, a steel with original impact value of 15 would test only 2.5 after heat treatment. One quarter per cent molybdenum corrects this defect. The impact loss is only two units, regardless of whether the core is tested, or the test piece case hardened before testing. Present practice is to use aluminum from 0.25 to 1 per cent,

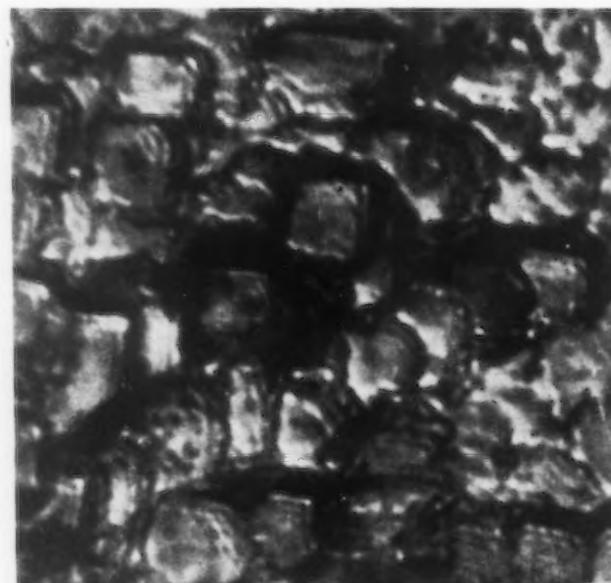
molybdenum 0.15 to 0.60 per cent, and low chromium. Ten to 15 hr. in ammonia at 875 to 950 deg. Fahr. is sufficient to give a case, comparable in Herbert pendulum hardness to cases developed on plain aluminum steels in a much longer time. Such parts installed in high-speed automobile engines are giving superior resistance to abrasion.

P. C. Osterman, American Gas Furnace Co., Elizabeth, N. J., confirmed the statement that molybdenum-aluminum steels give the hardest cases in ammonia, and the quickest penetration. Eight hours is all that is necessary for some commercial parts. Nitrification of ordinary carbon steels will probably be much used to induce a superior degree of corrosion resistance. Alloy steels, covered with mill scale, may be given a hard and useful case by nitrogen; a soft friable shell is produced, easily removable, and under this a hard surface is found.

When questioned regarding the use of these materials for gages, Mr. Kinzel said that aluminum steel changed 0.0003 in. per inch after nitrification; vanadium steel changed less than half as much.

Crystals Within Metallic Grains

Results of a new method of preparing metal samples for microscopic examination were shown by R. G. Guthrie, Peoples' Gas Light & Coke Co., Chicago, and J. Fletcher Harper, Allis-Chalmers Mfg. Co., Milwaukee, in a paper entitled "Crystal Micrography." Work has thus far been confined to pure metals or solid so-



Hot Forged Armco Ingots, Slowly Cooled but not Heat-Treated. Etched with hot concentrated hydrochloric acid. Magnified 2500 diameters

lutions, which, in the authors' opinion, appear much alike because conventional polishing methods produce a film of cold-worked metal which is only in special instances removed by the etching solutions. By methods which were not divulged an optically plane surface is produced by them, which after short pickling develops what would ordinarily be called etching pits, but which Messrs. Guthrie and Harper believe to be the real crystallographical constitution of the metallic grains. From the preliminary studies, certain ideas were advanced, tentatively, on the nature of martensite, and slip bands and the effect of plastic deformation. No evidence is found in high-power micros of the presence of amorphous material at the grain boundaries.

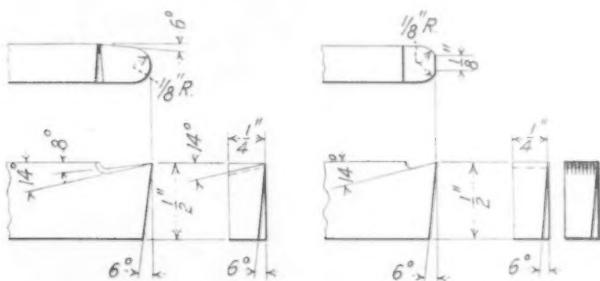
In the discussion the warning was sounded that the appearances developed may be more apparent than real. E. C. Bain, of Union Carbide & Carbon Research Laboratories, reminded those present that plastic flow and ruptured surfaces may give large single crystals the appearance of being made of a number of different blocklets, whereas thousands of X-ray spectograms failed to show any mixed orientation in such a single crystal. R. S. Archer, of Aluminum Co. of America, also warned against hasty conclusions, recalling the pronouncement that duralumin, which would season

*See THE IRON AGE, Aug. 5, 1926, page 340, and Sept. 30, 1926, page 916.

crack, is coarse grained (under the X-ray analysis) whereas fine grained material is permanent, and some ingenious speculations are based thereon. This pronouncement was made after a limited number of examinations, and has recently been shown to have no basis in fact.

Impurities in Tool Steel

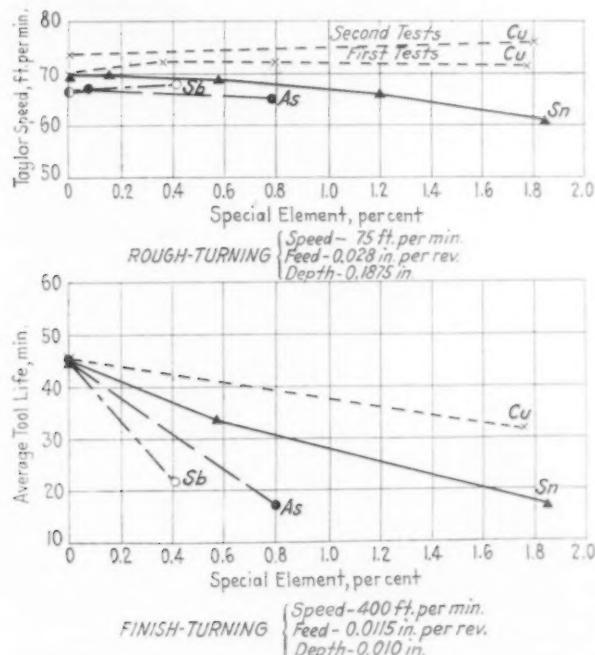
Some tool steel of the low-tungsten, high-vanadium type was melted in the electric furnace at the United States Bureau of Standards, poured into a ladle containing measured amounts of the impurity, cast into 55-lb. ingots, cooled, annealed, surfaced, reheated, and forged or rolled into 1½-in. square bars. Antimony up to 0.4 per cent, arsenic to 0.8 per cent, copper to 1.8 per cent and tin to 1.8 per cent were added. Cutting



Lathe Tools Used in Tests. Roughing tool at left, finishing tool at right. After breakdown, finishing tool has corrugations on nose

tests were then made, and results were reported by H. J. French and T. G. Digges in a paper entitled "Effects of Antimony, Arsenic, Copper and Tin in High-Speed Tool Steel."

Test tools of the shape illustrated were made and compared with a commercial steel known to represent the capabilities of the type chosen. In the rough-turning tests, figured back to the Taylor speed, the effect of the added metals is not great—copper in fact seems to improve the tool, a fact verified by a second test. Finish-turning tests have not yet been standardized, but in this instance were done by setting two tools in one holder for equal depth of cut. The "trailer" tool will then do no cutting as long as the "leader" shows no wear. Experience shows that when the leader has worn about 0.002 in. the trailer begins to cut, and this time marks the life of the leading tool. As compared with the standard tool, all four added metals show marked detriment to a finishing tool. The authors conclude, therefore, that these elements should be excluded



Copper, Tin, Antimony and Arsenic Affect Durability of Finish Turning Tools More Than Rough Turning Tools. All tests run without coolant

from the melt by careful selection of scrap and alloys if the best high-speed steel is to be made.

The steels with 1.7 per cent antimony and 1.8 per cent tin were very hot short, and could not be forged. The others forged; some developed surface cracks which were later machined out. The tin-bearing steels smoked during forging like molybdenum steels. None of the added elements caused any material change in hardness (either as quenched or after drawing at various temperatures) from that of the standard tool after equivalent heat treatment, with the exception of the tin-bearing steels which had about the same hardness after quenching at 2200, 2400 or 2500 deg. Fahr., and at all draws up to 900 deg. Microscopic examination revealed no abnormalities in any of the steels.

Finishing tools have a curious appearance after breakdown. As shown on the sketch they are ground with a blunt nose. After failure the end is corrugated with little ridges, extending down from the cutting edge about ½ in. and spaced according to the feed given the tool.

A steel manufacturer in commenting upon the difference between added impurities and residual impurities existing in the original ores or metals, said that the total of arsenic, antimony and tin must be less than 0.1 per cent in order to avoid trouble in rolling high-speed steel, especially on the thin edges. Chemical analyses of such elements in slight amounts is very difficult, however, and the user of impure ferrotungsten is never sure of just what he is getting.

Gray Iron Research Committee Meeting Changed to Pittsburgh

The meeting to consider a proposed organization for research work in gray iron foundry practice, which is being organized by the Philadelphia Foundrymen's Association and which was called to meet in Philadelphia on March 13, as published in THE IRON AGE, Jan. 26, page 309, has been changed to Pittsburgh for the same date. This is the result of a conference between the Philadelphia committee and representatives of the Western committee, held in Philadelphia on Feb. 7.

According to a tentative agenda, the summary of the Western viewpoint will be given by Walter Seelbach, with that of Philadelphia opinion presented by Walter Wood. This will be followed by an address by some prominent manager of a non-competing association and by general discussion.

Definition of Term for Special Annealing Wanted

The committee on heat treatment of ferrous castings of the American Foundrymen's Association calls the attention of steel foundrymen to tentative standard A-119-27-T of the American Society for Testing Materials, entitled, "Tentative Definitions of Terms Relating to Heat Treatment Operations." Under this heading the term "annealing" is defined as "a heating and cooling operation of a material in the solid state." This definition is necessarily broad in order to cover all types of annealing practice now in use. A full discussion of the subject appeared in the issue of the Bulletin of the American Foundrymen's Association for December, 1927.

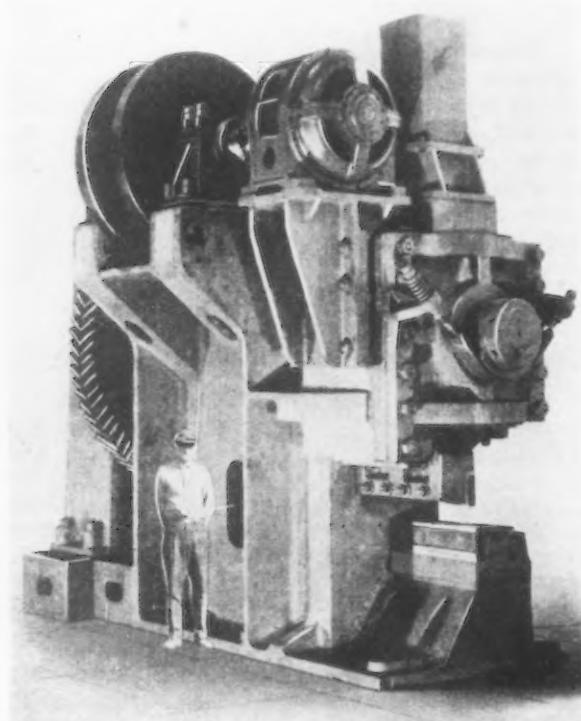
It has been suggested that a specific term be proposed for steel foundry slow-cool annealing practice in which castings are heated above the critical, followed by furnace cooling. Those interested in the question are invited to send their comments and criticisms to A. W. Lorenz, chairman of the committee, care of the Bucyrus-Erie Co., South Milwaukee, Wis.

Total apparent consumption of babbitt metal in January, based on reports received by the Department of Commerce from 31 firms, was 4,928,517 lb., compared with 4,465,787 lb. in December, and 5,439,689 lb. in January, 1927.

Large Shear Cuts Cold Alloy Steel Bars 5 In. and Less in Diameter

A new open-throat shear of large capacity and having improvements which facilitate operation and reduce maintenance has been brought out by the Mackintosh-Hemphill Co., Pittsburgh. The capacity is for cutting 4½-in. square or 5-in. round cold alloy steel. The stroke of the shear is 6½ in. and cuts are made at the rate of about 15 per min.

The massiveness of the machine may be noted from the illustration. The height is approximately 16 ft. and the weight is about 225,000 lb., 80,000 lb. of which is in the shear frame alone. The pressure at the knife is 1,400,000 lb. A 125-hp. motor, mounted on top of the frame, is employed to drive the machine. Drive gears are also mounted on top of the shear, which arrangement is intended to provide increased floor space



Alloy Steel May Be Sheared at the Rate of Approximately 15 Cuts Per Min. The weight of the machine is 112 1-2 tons

around the machine and place the motor drive where it is less exposed to injury.

All gears, including master gear and pinion, have herringbone cut teeth with a solid apex. The motor pinion and motor gear shaft are provided with ring oil bearings having babbitt lined shells fitted in steel bearing bases which are rigidly keyed and bolted to the shear frame. Symmetrically spaced on the pinion shaft are two 63-in. flywheels which serve to equalize the load on the motor shaft bearings. The flywheels, as well as all gears, are inclosed in oil-tight covers.

The eccentric shaft has a square end on which the loose clutch slides. It is supported in two bearings on the frame of the shear and by an outboard bearing at the clutch end, as well as by one in the face plate. The eccentric is provided with a solid bronze slide which is mounted on the top ram. Bronze liners are also placed between the ram and the shear frame, and the front side of the ram is equipped with an adjustable wedge for taking up wear. An air-operated jaw clutch is also mounted on top of the frame.

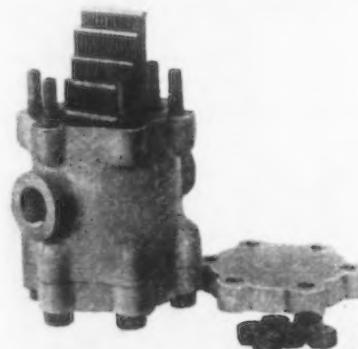
The top knife block is balanced by means of a double spring at the top of the shear which is easily accessible for adjustment or replacement. To insure the stopping of the top knife block in the upper position, a band brake is provided at the end of the eccentric shaft. This comes into action automatically as the ram reaches the top of its stroke and goes out of action when the material is being cut. Lubrication of this machine has been given thorough attention.

Purifier For Use in Connection with Air, Steam and Gas Lines

The Andrews-Bradshaw Co., division of the Blaw-Knox Co., Pittsburgh, has brought out a "pipe line Tracyfier" for use in connection with air, steam or gas lines up to 3 in. The device is similar in principle to the company's larger purifying device known as the Tracyfier.

In saturated steam lines the device is said to remove all moisture, delivering standard specification steam that is free from solids, both soluble and insoluble. It may also be used in gas-producer steam lines to maintain more uniform hydrogen content in

In Air Lines, One Purifying Unit Will Dry and Clean the Air for Several Tools



the gas and in the steam lines leading to the tar burners on open-hearth furnaces. In the latter application the dried steam is said to produce a shorter, hotter and more uniform flame, save approximately a gallon of tar per ton of steel, and keep the checker chambers cleaner. In connection with air lines, one "pipe line Tracyfier" may be used for drying and cleaning the air for several tools, and it is claimed that in lowering the out-of-service time the output of each pneumatic tool is increased. The device may be used also for removing, either for recovery or elimination, of drops of liquid carried by gases.

Induction Motors Designed for Starting on Full Line Voltage

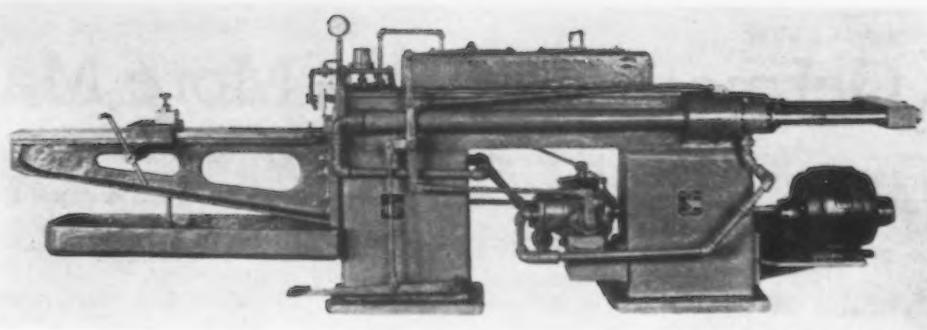
Line Start squirrel-cage induction motors designed for starting on full line voltage have been placed on the market by Allis-Chalmers Mfg. Co., Milwaukee.

Starting Equipment Consists of Magnetic Switch With Push-Button Control



These motors are normal torque, high reactance machines and will not, it is stated, draw starting current in excess of the limits recommended by the electrical apparatus committee of the National Electric Light Association. They are available in ratings from 7½ to 30-hp., 600 to 3600 r.p.m., low voltage, and with either sleeve or roller bearings. Magnetic switch with push-button control is the only starting equipment required.

Broaches Up to 50 in. Long May Be Used. Cutting speeds range from 0 to 28 ft. per min.



Broaching Machine With Variable Cutting and Return Speeds

Variable speed hydraulic cutting and return strokes and twin-cylinder construction are features of a new No. 2 hydraulic broaching machine which has been added to the line of the American Broach & Machine Co., Ann Arbor, Mich.

The range of cutting speed is from 0 to 28 ft. per min. and the return speeds up to 60 ft. per min. are obtainable. The stroke is sufficient to permit use of broaches 50 in. long. The machine is fitted with hand and foot lever controls and a direct-reading gage that indicates the amount of pressure applied. The front of the machine has a finished face which extends to within a few inches of the floor and to which support tables or fixtures may be attached. The unit illustrated is equipped with the support table, carriage and oil pan.

Twin-cylinder construction, used in other horizontal hydraulic broaching machines built by the company,

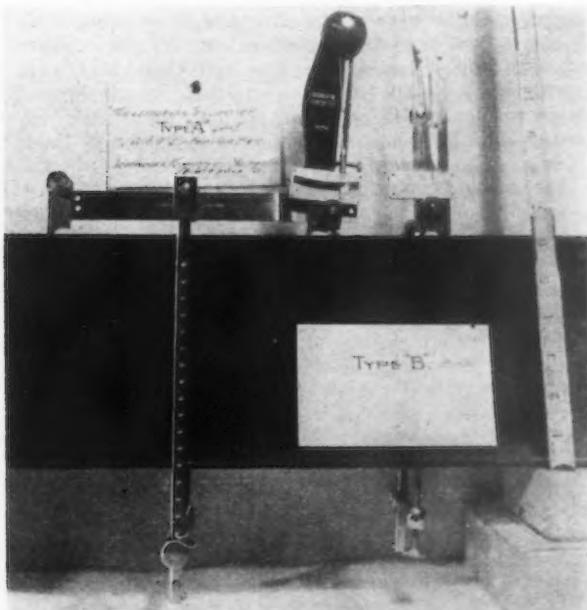
is emphasized as giving the advantage of applying pressure on the full area of the piston and avoiding high pressure against the packing glands. The bore in the cylinder is $2\frac{1}{4}$ in. The machine is fitted with three rams, $2\frac{1}{2}$ in. in diameter, one in each cylinder and one for operating the sliding head, all three being connected by means of a cross head and all moving simultaneously. Cylinders are of steel, machined and honed to assure high finish, and are fitted with pistons having two conventional type piston rings and leather cups. The oil tank has capacity of approximately 15 gal. The pump operates under pressure of 1000 lb.

The bore in the face of the machine is 5 in. in diameter. The pulling head is tapped 2 in., 8 pitch. Vertical adjustment of $1\frac{1}{2}$ in. above center, and 1 in. below center is provided. The sliding head is fitted with hardened steel shoes which operate in box-shaped ways. The speed of the pump is 900 r.p.m. A 5-hp., 900 r.p.m. constant-speed motor is recommended. The weight of the machine is 4000 lb.

Tensometer or Strain Gage

To measure accurately the extension of a material under test in a tensile testing machine, the Southwark Foundry & Machine Co., Philadelphia, is putting out the Huggenberger tensometer, of which an illustration is given. This is manufactured in Zurich, Switzerland, and avoids the use of the dial indicator. It is based on the lever principle and is made in several types for varying uses.

That shown at the left of the illustration is type A, with a tilting knife edge at the lower right extremity of the working section. This is essentially a laboratory instrument, possessing the requisite precision and sensitivity. The lever multiplication is about 1200 to 1, which makes it possible to measure a change in the



Two Forms of the Tensometer Are Here Shown. That at left is the high-precision type for laboratory use; at right is the outdoor type, which may be used regardless of exposure to rain, snow or dust.

length of a specimen when this change is as much as 0.00001 in.

Type B, shown at the right of the illustration, is of more rugged construction and is designed for use in the field. The lever multiplication is about 1000 to 1, giving about the same sensitiveness in measurement. This instrument can be used even under exposure to dust, rain, and snow, as all moving parts are outside the frame, where they may be readily cleaned and inspected.

Spang, Chalfant Reorganization Completed

Henry Chalfant, who was chairman of the board of Spang, Chalfant & Co., Inc., Pittsburgh, prior to the merging with that company of the Standard Seamless Tube Co., continues as chairman in the new and enlarged company, while W. C. Fownes, Jr., who was treasurer and general manager Standard Seamless Tube Co., becomes chairman of the executive committee. Gordon Fisher continues as president, Charles F. Cruciger as vice-president and treasurer, and C. R. Barton, who was general superintendent Standard Seamless Tube Co., and W. J. Hampton, who has had charge of operations, for Spang, Chalfant & Co., are vice-presidents of the new company. These men and J. H. Hillman, Jr., W. S. Mitchell, A. B. Sheets, I. C. Chalfant and C. F. Beachler comprise the board of directors.

The capital structure of the new company consists of 150,000 shares 6 per cent cumulative preferred stock of \$100 par value, and 1,000,000 shares of common stock of no par value, of which 117,500 shares of the preferred and 750,000 shares of the common have been issued. Of \$12,000,000 first mortgage 5 per cent sinking fund bonds authorized, \$10,000,000 is to be issued, the proceeds to be used for the acquisition of the business and assets of the Standard Seamless Tube Co. The company has acquired 100,000 shares of 375,625 shares of common stock outstanding of the Oil Well Supply Co., having a present market value of approximately \$3,500,000. The old Spang, Chalfant & Co. was capitalized at \$7,000,000 and the Standard Seamless Tube Co. at \$2,000,000.

Germany Imports More Machinery

Buy's More Special Machinery but Fewer Machine Tools—Trade with United States Strongly Favorable to This Country—German Output Recovers

BEFORE the war, machine tools formed a large share of the German machinery imports, particularly those coming from the United States, according to a report by Theodore Pilger, American trade commissioner, Berlin, Germany. Since the war this trade in machine tools has never returned to the pre-war levels, but a part of the loss has been replaced by the sale of much special industrial machinery. This is of a widely varied type, such as road-building equipment; conserving, canning and packing machinery; printing and paper-working machinery, and special-purpose equipment for all industries which are now being modernized.

The amount of machinery imports in 1927 was 62 per cent of the amount imported in 1913, and the value of imports in 1927 was 130 per cent of 1913. The price per pound of machinery imported into Germany rose from 11c. in 1913 to 24c. in 1924, and was 23c. in 1927. In the past year German machinery imports exceeded 1926 imports by nearly 50 per cent, in both value and tonnage. The United States has been furnishing a considerable part of these increased imports, and German industrialists are looking here for the latest and most modern equipment in every field.

German Machinery Exports 87 Per Cent of Pre-War Volume

Exports in 1925 and in 1926 averaged about 35 per cent of the total German machinery production, but because of the increased domestic demand, 1927 exports were probably not over 30 per cent of total production. In 1927, 458,000 tons of machinery was exported with a value of 870,000,000 marks, about 87 per cent of the pre-war value, when corrected for the higher price level. The price per pound on machinery exported has also shown a steady rise in recent years, in 1911 to 1913 averaging 12c.; in 1924, 18c.; in 1926, 19c., and in 1927, 20c. The gain may be largely attributed to the use of less metal of a better quality than was used in pre-war years. Furthermore, German machinery manufacturers are now using better cost accounting systems than before, their quotations on foreign business are beginning to rise somewhat.

It also appears that considerable progress has been made in improved design, based principally upon the better raw material now obtainable. Germany is now using higher grade iron ores imported from Sweden, Spain and Morocco, instead of the low-grade "spath" ore from the Siegerland and the "minette" ore from Lorraine. Furthermore, Siemens-Martin furnaces are being used in the manufacture of steel to a much greater extent than heretofore.

Textile machinery is the most prominent group of German exports, followed by metal-working and power-generating machinery and agricultural implements.

Trade with United States Almost Balanced in Tonnage

In 1926, 70 per cent of Germany's total machinery exports were sold to other parts of Europe; 11.6 per cent to Latin America; 7 per cent to Asia; 4.7 per cent to the United States and Canada, and 1.5 per cent to Africa.

Official statistics recently issued by the German Government for 1927 show that German machinery exports to the United States (13,528 metric tons) were only 99 metric tons greater than the German machinery imports from the United States. Despite the virtual balance in weight, by value the balance is strongly favorable to the United States, as the pound price of

the United States exports is much over the pound price of German exports.

In 1913 the United States was in thirteenth place as a buyer of German machinery. In 1924 it was fourteenth; in 1925 fifteenth, but in 1926 it rose to sixth place as a German machinery customer. In 1925 the United States bought 8153 metric tons of German machinery, valued at 18,990,000 marks; in 1926, 17,839 tons, valued at 34,639,000 marks, and in 1927, 13,528 metric tons (value not yet made public). Although 1926 was, therefore, an extraordinary year, it does appear that the United States is steadily increasing its purchases of German machinery.

Factors Contributing to Recovery of German Machinery Industry

Much of the recovery made by the German machinery industry since the beginning of 1924, according to Mr. Pilger's report, may be attributed to corporate consolidations, cartels, foreign loans made to Germany during the period, Government support of engineering industries, and good labor at low wages. Although exports by tonnage have not quite reached the high mark of 1913, it is believed that 1927 was one of the greatest production years in the country's history.

Financial Structure and Loans

German machinery builders, in line with all other German manufacturers, have found it advisable to report fixed capital as low as possible, and in spite of great enlargements made during the war, statements of fixed capital are almost the same now as in 1913. Legal and other reserves, as well as long term obligations, have practically disappeared from balance sheets. Although the average profit on invested capital in 1925 was only 1.4 per cent, earnings were much better in 1927. Concentration of industry has also been actively forced, first as a result of inflation and later because of competition. This consolidation movement has been much more evident in the basic raw material field than in the finished manufacturing lines.

This stabilizing corporate activity would not have been possible, in view of the shortage of working capital, had it not been for generous loans made to Germany by foreign countries. The last two years have also shown marked progress in the negotiation of foreign trade treaties in which the machinery industry has taken a large part. It has also declared itself in favor of a gradual reduction in the German tariff on machinery in order to encourage corresponding reductions by other countries. An increasing amount

Comparison of Machinery Industries in Germany and the United States in 1925

	Germany	United States
Number of factories engaged in machinery building	15,965	8,154
Total annual machinery producing capacity	\$1,200,000,000	\$4,050,000,000
1925, German estimate	612,165	481,212
Total number of employees	Average number of employees per factory	38
Percentage of salaried employees to total employees	17.2	18.5
Total horsepower in use	635,000	1,424,259
Horsepower per employee	1.04	3.38
Value of production	\$690,000,000	\$2,232,985,974
Value of production per employee	\$1,090	\$4,640
Value exported in 1925	\$175,000,000	\$149,379,000
Value exported in 1927	\$207,000,000	\$180,167,000
Percentage of production going to export	39	6.7

of German machinery is also coming into the world's markets as "satisfaction for war indemnity."

Government Support

Government support to the German machinery industry embraces: Reduction of 50 per cent in inland freight rates covering export shipments, Government export credit insurance, a Government guarantee of export credits granted to various purchasers, Government ownership or controlling interest in a number of machinery factories, furnishing special banks with funds at rates below the regular market which are made available to finance export shipments, support of standardization and simplification programs, countenancing of cartels, trusts and other price-regulating organizations and permitting sales abroad at lower prices than in the protected domestic market.

Stable Labor Conditions and Low Wages

Labor conditions, the fourth factor in the recovery of the German machinery industry, seem to have become stable. Although the trend is upward, it is not believed that any rapid increase in wages is likely. Efficiency and output are rapidly increasing by the use of greater power and the adoption of American production methods. Although the legal working day is now 8 hr. in Germany there is no difficulty in obtaining workmen for overtime at the regular hourly wage. The matter of "hours" in Germany is less a matter of law than of unfilled orders in the shops.

Germany's Share in World Production

According to a monograph on the world's engineering industries published at the International Economic Conference at Geneva in 1927, Germany claims to have built about 21 per cent of the total world output of machinery in 1913, compared on a basis of value, while Great Britain built 12 per cent; and the United States, 50 per cent. Reducing 1925 values to pre-war

levels, Germany claims that in that year she built only about 13 per cent of the world's output of machinery, with Great Britain and the United States building 14 and 58 per cent respectively.

Germany claimed in 1925 to have manufacturing capacity sufficient to turn out \$1,200,000,000 worth of machinery annually and that its factories were about 70 per cent active. These German statistics gave the United States capacity at \$4,000,000,000 and set Great Britain at \$825,000,000 annually, with the capacity of the entire world at \$7,000,000,000. Of the world's exports of machinery in 1913 Germany supplied 29 per cent, Great Britain 28 per cent and the United States 27 per cent, according to the monograph. Based on pre-war values, the United States supplied 34 per cent, Great Britain, 24 per cent, and Germany, 21 per cent of the total world exports in 1925.

German and American Industries Compared

As shown in the accompanying table, Germany employs 21 per cent more persons in its machinery factories than does the United States, but each man has only 1.04 hp. furnished to him, as compared with 3.38 hp. per employee in the United States. Largely for this reason, the American workman produces \$4,640 worth of machinery per year, or over four times that of his German colleague.

The relative importance of export markets to the United States and to Germany is shown by the fact that foreign shipments represented only 6.7 per cent of American production as compared with 39 per cent for Germany. The machinery trade from and to Germany in 1926 gave an excess of exports over imports amounting to 706,000,000 marks, which is one-eighth of the total excess exports of that year for all important manufactured commodities which showed an export surplus. Furthermore, it is one-eighth of the total net importation of foodstuffs and raw materials which Germany brought in.

Power Transmission Association Holds First Regional Meeting

The first of a series of regional meetings of the Power Transmission Association was held at the Poor Richard Club, Philadelphia, Feb. 3. The attendance was in excess of 100 and included manufacturers, distributors, engineers and salesmen of mechanical power transmission equipment.

W. H. Fisher, vice-president of the T. B. Woods Sons Co., Chambersburg, Pa., and president of the association, presided at the meeting. The general object of these regional conferences, the next of which will be held in Chicago, is to acquaint members of the industry with the purposes and scope of the association, which aims to promote the most efficient and economical distribution of power. It is planned to collect and disseminate data that will be helpful to representatives of the industry in cooperating with the users of power transmission equipment in selecting the most efficient method of drive. It was explained that the association is committed to "the right drive in the right place."

T. E. Hazell, vice-president of the William H. Taylor Co., Allentown, Pa., and member of the association's dealer relations committee, in an address following that of Mr. Wood, pointed out that the association would fill a long-felt want in providing the necessary supplementary consulting engineering and technical service for distributors and dealers. The association would provide a place to which salesmen could refer special problems and secure the experience of users and the recommendations of engineers, he said.

At the annual meeting of the association in New York, Dec. 7, an advertising program to acquaint the users of power equipment with the purposes of the association was suggested, the advertising space to be appropriated for the association from the member's schedules. Roy C. Moore, Charles A. Schieren Co., New York, chairman of the advertising committee, explained the progress made and predicted that the program adopted would prove to be an outstanding example of coordinated and cooperative advertising, of high value

to the association and to each member company contributing use of its space.

Charles E. Carpenter, E. F. Houghton & Co., Philadelphia, emphasized the value of the opportunity afforded by the association in showing the place of the products of its members in the equipment of programs of plants throughout the country. Other speakers included L. H. Shingle, Shingle-Gibb Leather Co., Philadelphia; W. A. Staniar, engineer of the Du Pont companies, Wilmington, Del., and chairman of the association's board of advisory engineers, and W. S. Hays, executive secretary of the association.

At a meeting of the executive committee nine regional chairmen or team captains were named to head an "every member get a member" drive. Edward H. Ball, president, Chicago Belting Co., Chicago, is general chairman. The regional chairmen are: H. E. Whiting, Whiting Leather & Belting Co., Long Island City, N. Y.; Charles M. Murray, Transmission Ball Bearing Co., Buffalo; Stiles C. Smith, Smith Power Transmission Co., Cleveland; D. I. Wheeler, Whitney Mfg. Co., Hartford; F. H. Willard, Graton & Knight Co., Worcester; A. G. Snider, Hide Leather & Belting Co., Indianapolis; H. J. Heasley, G. W. Sadler Belting Co., Montreal, Canada; J. E. Henry, Medart Co., St. Louis, and H. P. Degen, H. P. Degen Belting Co., San Francisco.

Employment Off During January in Illinois—Improvement Looked For

Employment in Illinois dropped 2.1 per cent during January and reached the lowest level since the war, according to a report recently issued by the State Department of Labor. Immediate prospects in metal and wood industries, as well as in other industries, notably iron foundries and printing trades, indicate a general industrial improvement in February, according to the report. Automobile establishments reported a gain of 2.6 per cent. In sheet-metal and electrical products establishments the course of employment was downward during January.

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Current Statistical Data, Considered Independently of Trade Opinion, Indicate That:

Steel ingot output (adjusted) increased with unusual sharpness in January and probably will continue upward for a time.

Unfilled orders showed a smaller increase than in December, and less than the gain in ingot production.

Pig iron production advanced to normal, making a smaller gain than ingot output and early price recovery may be expected.

Finished steel prices, still too low for a proper relation with their raw materials, advanced during the month to a better position.

IN general, the impression to be gained from an examination of the steel statistics this month is that of the "scared bull." The trend is favorable, as we had anticipated it would be at this time. But conditions are not altogether conducive to a sustained improvement in the industry. Production appears to be well up with requirements, and is large enough to arouse doubts as to any large advance in prices. The question is being asked, are the consumers not taking more steel than they actually require?

This is at least a reasonable question, in view of the fact that ingot production is in excess of theoretical normal requirements and the further fact that prices have been suspiciously slow in advancing when compared with the sharp gains in unfilled orders and in the volume of production. It may well be asked why prices are so low. And the answer must be that either the supply, including stocks, is large, or the demand is small, or both conditions are true. Consumers have thus far merely shown a willingness to take a large quantity—at a low price.

Ingot Output Jumps Above Normal

STEEL ingot production was sharply upward in January. Not only did it rise more than usual for the season, but enough to carry the average daily production from 10 per cent below normal to nearly 5 per cent above normal. The only comparable gains in recent years have been in August, 1924, and April, 1923. Nothing approaching it has appeared in January.

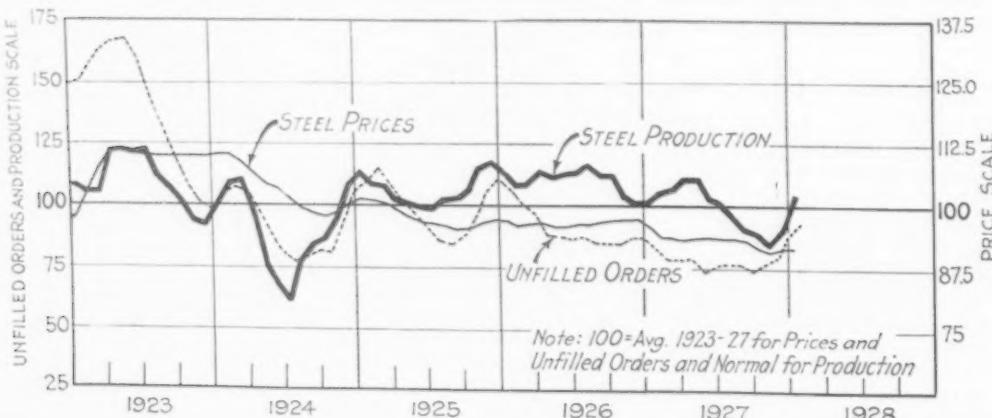
Our adjusted index of ingot production, allowing for normal growth and for seasonal variation, is 104.7 per cent of normal, against 89.8 per cent in December and 101.5 per cent in January, 1927. It is thus not only higher than a year ago, but represents the highest

annual rate of ingot production that has existed since last May. Such expansion rarely occurs except under one or two circumstances: (1) at the beginning of a period of sustained recovery (as in 1922 and 1924), or (2) near the end of a recovery (as in April, 1923, December, 1924, and November, 1925).

It is significant as to the present case that the expansion starts from a sub-normal point, as to both steel production and activity in most of the chief consuming industries, notably in the automobile, railroad and mining branches. Naturally, this suggests that the recovery is not a mere final spasm at the peak of a business boom. On the other hand, it carries production in one leap above normal and, as shown last week in this department, above the indicated level of the potential requirements of the chief consuming industries. Accordingly, some doubt may well exist as to the continuance of the upward movement for any prolonged period.

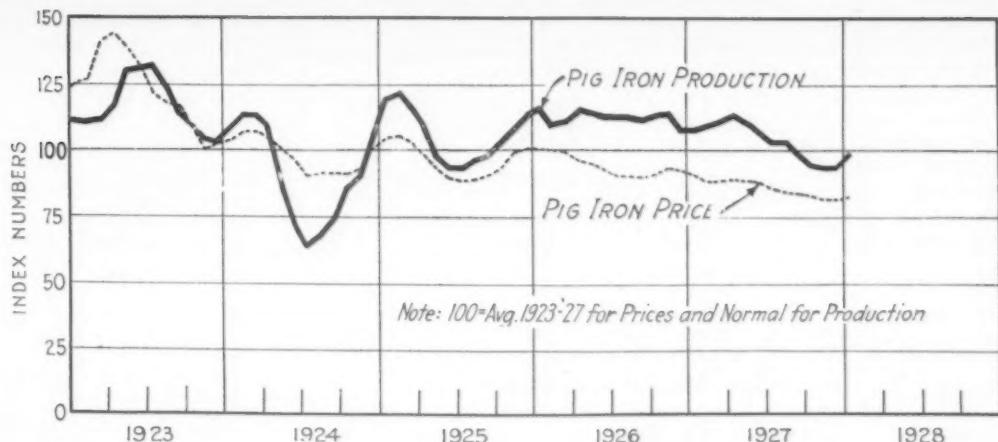
Some light on the question might be expected from the condition of unfilled orders. If unfilled orders were large and continually rising, production might easily continue to expand. Unfilled orders are rising (or have been rising), but they are not yet large, and the January increase was less than that which occurred in December. The production curve gained on the unfilled orders curve. Thus we are left in doubt.

The price situation is the result of demand and supply conditions, and as we know something about supply we may infer something about demand. The price trend is slightly upward. At this writing THE IRON AGE index of finished steel prices is 2.364c. The average for January was 2.32c., which compares with 2.31c. in December and 2.30c. in November. The January average is 91.6 per cent of the average for the five years 1923-1927. This appears to be but a halting response to the rise in the unfilled orders. Moreover,



Note: 100=Avg. 1923-27 for Prices and Unfilled Orders and Normal for Production

Fig. 2—Good Recovery in Output of Pig Iron May Presage an Approaching Advancement in Prices. But weakness in fuel and scrap may retard the recovery



it shows that producers are willing to expand production in spite of a low price level. There is no indication of much gain in the intensity of demand. Again we are left in doubt.

Normal Output of Pig Iron

PIG iron production increased approximately to the normal level last month. After falling to 93.2 per cent of normal in November, it rose to 99.7 per cent in January. These figures allow for both seasonal variation and a conservatively determined factor of normal growth. Thus it may be noted that, in spite of a considerable recession in industry, the pig iron output was reduced only to 7 per cent below estimated normal, and continued below normal only four months.

As usual, the price of pig iron has rather closely followed the direction of the production curve. At this writing, THE IRON AGE composite is \$17.75. The average for January was \$17.65, which compares with \$17.54 in December, the low month. The January average was 82.5 per cent of the average for the five years 1923-1927. It will be remembered that finished steel prices were 91.6 per cent of the five-year average. (Also, steel production was more sharply curtailed than was the pig iron output, and it fell further below normal.)

Thus it can be said that pig iron has suffered more over-production and greater price weakness than has steel. But it can also be said that pig iron production expanded less rapidly than steel production in January. In fact, the ratio of pig iron production to steel production fell with unusual sharpness in that month. Considering the trend of the steel markets, this cir-

cumstance is favorable to higher pig iron prices. And it seems likely that, in spite of some unfavorable conditions, prices will move higher during the next month or two. The advance, however, will certainly be moderated by the weakness in fuel and in steel scrap.

One might guess that the average daily production of pig iron may run up to about 105,000 tons in February, and possibly to around 111,000 tons in March, attended by moderately stronger prices, but it would be too daring to try to look beyond that point.

Finished Steel Prices Slightly Higher

THE outstanding change in the iron and steel price structure during January was the higher level of finished steel. Sheets, nails and bars were all higher, as appears in the third chart. The fact appears to be that prevailing prices at the end of 1927 were much too low, and that they have been marked up a little on this account rather than through the urgency of demand. They are still by no means high and are probably not high enough to give an adequate profit to the average manufacturer.

Almost equally notable are the continued stability in the price of semi-finished steel, the inability of scrap to make progress on the upside, and the weakness of fuel.

A third fact is the existence of some independent strength in the pig iron market, which is advancing much as we had forecast. The gain here is apparently due chiefly to the relatively great expansion in steel-making requirements, which obviously tends to reduce the supply in the merchant markets. Several large melters, including a leading radiator company, have

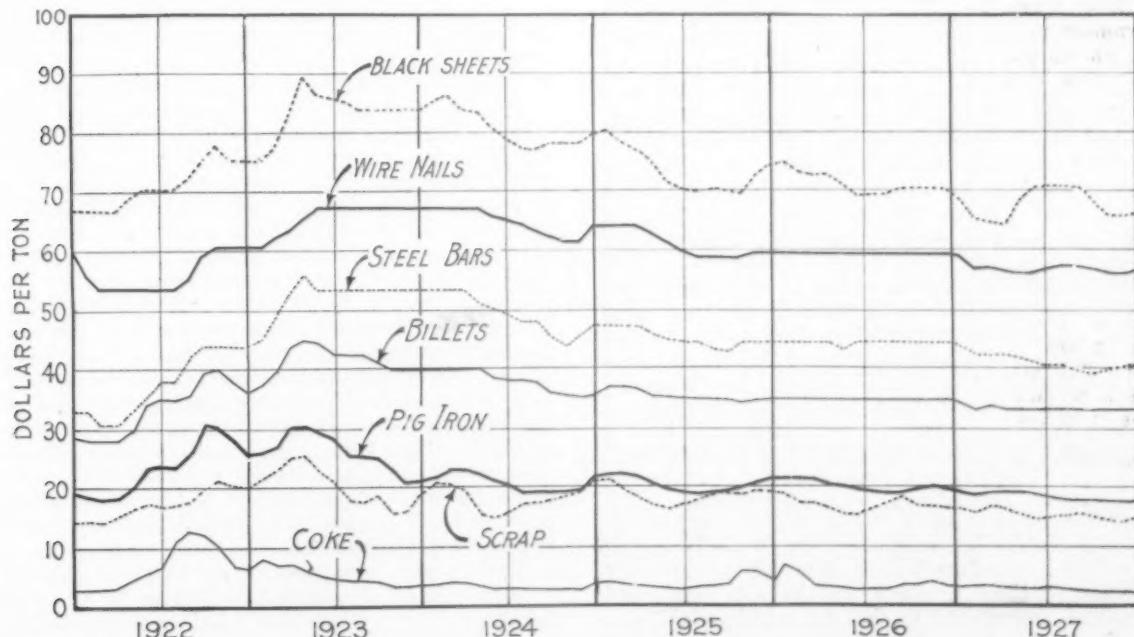


Fig. 3—Finished Steel Prices (in Particular, Sheets, Nails and Bars) Made an Advance, Putting Them into Better Position with Regard to Semi-Finished and Raw Materials. Readjustment of the price structure may be sustained if it stands the test of second-quarter buying

therefore covered their requirements for the second quarter. This at least shows that there is fair activity in the radiator, pipe and foundry business.

Our general impressions are that there is a certain lack of spontaneity in the prices of finished steel. Ingots production has been rapidly expanded and is above normal, while the price of steel shows no particular strength. Fuel is abundant and cheap. The same may be said of steel scrap. In recognition of the fact that pig iron prices could be forced no lower, and that no

declines were to be expected in the first quarter, the pig iron markets have shown some strength.

It seems that finished steel prices have been pushed up from beneath, as the result of low margins of profit and some reduction in the resistance by consumers. Not until finished steel prices stand the test of second-quarter buying, however, can we be sure that a sustained recovery is in process. We find unusual difficulty in arriving at any conclusion, aside from the opinion that pig iron will probably show further advances.

ATTACKS CARTEL IDEA

Assistant to Attorney General Commends Anti-Trust Laws—Cites Existing Check on Foreign Competition

WASHINGTON, Feb. 20.—The policy of American law as it relates to industrial combinations is based upon the principle of competition, including equal opportunity, maintenance of individual initiative, freedom from Government regulations and absence of power to control prices or allot territory or customers, and differs sharply from the Continental European theory, Col. William J. Donovan, assistant to the attorney general, told the American Chemical Industry conference here on Thursday of last week. Speaking on "Foreign Cartels and American Industry," Colonel Donovan entirely discouraged the idea of those who, he said, have been urging amendment of the anti-trust laws so that American combinations similar to European combinations may be developed in order to meet more effectively threatened competition from abroad.

"It would seem that those who urge such amendments to our laws—amendments permitting combinations in industry resulting in monopoly—forget the historical, inevitable result of such a tendency," it was declared. "It would mean that the people of this country would not permit monopolistic power to go unregulated. If your industry is permitted to attain that extent of combination which results in elimination of competition, the people of the country, for their own protection, would insist that there should be greater Governmental supervision and control. So that those among you who, because of fear of foreign competition, grow panicky and urge what is in effect a surrender to the Continental principle of trade ought to pause and consider whether or not there is not greater opportunity for more effective and unhampered development of your industry under our existing laws."

Colonel Donovan then explained the means this Government has to protect American industry against a foreign monopoly which comes into this country and by collusion with citizens of the United States enters into agreements for the restraint of trade and enhancement of prices. The basis for his contention is found in the anti-trust provisions of the Wilson tariff act of 1894, which was never invoked until two years ago and was not passed on by the Supreme Court until last year, he said. The act provides that every contract between two or more persons or corporations, either of whom is engaged in importing, is illegal and void if it is intended to operate in restraint of trade or designed to increase the market prices in the United States of any article imported or intended to be imported. This act was held by Colonel Donovan to constitute a measure of protection against the illegal activities of foreign trusts in American jurisdiction.

Legalization of Combinations to Buy Foreign Raw Materials Proposed

Touching on affirmative measures to foster American foreign trade, he mentioned the Webb-Pomerene act permitting consolidations of domestic interests for exportation of their products and he also mentioned the proposed amendment to that act which would permit similar combinations for purposes of importing raw materials. He declared that it is quite clear that Congress contemplates the enactment of constructive legislation, not only to protect American industry from un-

warranted attacks from abroad, but to enable American industry to have a fair opportunity of meeting foreign competition in neutral markets.

"But all statutes and all the aid that Governmental departments may give are of no avail unless there is an intelligent conduct of business itself," said Colonel Donovan. "There are those who believe that the principle of competition means that a premium is placed on drastic and destructive competition; but the law itself has recognized that destructive competition is of no benefit, even to the consumer. Cooperation in industry is not forbidden. It has been pointed out by the Supreme Court that the Sherman law did not intend to place a penalty upon intelligence in business. A manufacturer is entitled to exercise the business virtues which are based upon a knowledge of actual conditions."

Scope of Trade Association Activity Defined

Pointing out that the true course of conduct for trade associations has been laid down by certain decisions of the Supreme Court, Colonel Donovan explained that it is clear under those decisions that associations of competitors in any particular line of commerce which have solely for their purpose the collection and dissemination of statistical information as to the exact existing conditions and past transactions do not violate the anti-trust laws.

"It is only where the collection and dissemination of information and its subsequent discussion leads to agreements as to prices, customers or allocation of territory that the entire combination falls within the provisions of the Sherman law," it was declared, "and such conduct is forbidden for the very reason that persons and concerns agreeing to the imposition of arbitrary conditions must always submit themselves to the will of others."

Better Distribution Essential to Prosperity—Dr. Julius Klein

In speaking on "Factors in Profitable Prosperity," Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce, declared that two factors essential to prosperity are the most rigorous scrutiny of the costs and wastes of distribution and the fullest exploitation of foreign markets. The matter of better distribution, he stated, in spite of the increasing publicity that has been given to the problem, is still evidently in need of much further analysis and exploitation.

He cited different examples showing progress made in waste elimination and production and pointed out that the value of American manufactured products increased from 1923 to 1925 by not less than \$2,500,000,000 and that meanwhile there was a decrease of some 400,000 employees. He said this fact has created some alarm lest there would be a great amount of unemployment, but explained that those leaving the manufacturing lines as the result of greater output per man due to improved machinery, increased efficiency, etc., have gone into non-manufacturing pursuits. He said that the net increase of employment and servicing functions, which, after all, are the direct and immediate outcome of greater production, has more than taken up the slack created by any curtailment in manufacturing payrolls.

One means of eliminating waste in distribution urged by Doctor Klein was a better understanding of markets with a view to concentrating upon them rather than trying to spread out to sparse markets, with high costs of delivery and other obstacles to efficiency and profits in industry.

Blast Furnace Practice in Europe

Outstanding Paper Before Furnace and Coke Association—
Round Table Discussions on Other Topics Bring
Out Sharp Differences

MEETINGS of the Eastern States Blast Furnace and Coke Oven Association usually are productive of interesting discussions of matters pertaining to blast furnace and coke oven operations, and it rarely happens that something of outstanding interest fails to get before these assemblages. At the fall meeting of the association, held at the Shannopin Country Club, Ben Avon, Pa., it was an intimate picture of a blast furnace capable of producing 1000 tons daily and which, in a run of 45 days, actually averaged 903 tons daily.

At the mid-winter meeting held Feb. 17 at the William Penn Hotel, Pittsburgh, it was a paper on "Blast Furnace Practice in Europe," by F. H. Willcox, vice-president Freyn Engineering Co., Chicago. In detailing his personal observations, on an extended tour of blast furnaces and steel works in Germany, France and Luxemburg, Mr. Willcox touched upon a subject that has been freely discussed when blast furnace men have met. For several months word has been coming from Germany of the wonderful production records of blast furnaces there. It has been said that, in furnaces of what would be called small hearth diameters on this side of the water, there have been daily outputs of 800 to 900 tons, while in 16-ft. hearth furnaces as much as 1100 and 1200 tons daily has been made.

How the Germans Obtain High Output

Mr. Willcox, whose paper will be published later, gave the details of the ore mixtures and other reasons making these performances possible. The German iron makers are favored by being able to draw upon a wide variety of ores. By sintering fine ores and carefully charging coarse and fine ores in layers, they obtain an open burden which is easily reduced without recourse to high blast pressure or excessive use of coke. He said that there is a close similarity between the ore practice of German furnaces and those in the eastern part of the United States. Coke is not so carefully prepared as on this side of the water, and is not of such good quality, as Ruhr coal does not make a good coke, but it is strong in structure and does not break up. Scrap is not heavily used.

Touching on construction of the furnaces and the bin systems, Mr. Willcox noted that in many respects the German furnaces are heavier than American stacks, but lighter in others, while on account of the distance from receiving ports, the bins are large enough to carry stocks sufficient for several months. The bins are used for storage purposes, there being a complete absence of ore storage yards served by ore bridges. Charging is done by three or four men and there usually are four or five scale-car tracks. There has been considerable grief in the use of two stoves for the hot blast, although the stoves have considerably larger heating surfaces than American stoves.

He said that German success cannot be ascribed to any single cause, but rather is traceable to a combination of causes. He argued that American furnace men, doing their own thinking and not being too greatly influenced by German practices, can accomplish as great success in getting out tonnage as has been achieved abroad. Mr. Willcox said that in England the effect of the coal strike of a year ago has not worn off and that, accordingly, blast furnace and industrial progress is less marked there than on the Continent.

Round-Table Discussions Animated

Following out the plan inaugurated at the fall meeting, the program for the mid-winter meeting was divided into separate round-table discussions of blast furnace and coke oven subjects during the morning, with a joint meeting in the afternoon. For scope of

discussions, the meeting set new high standards. Haakon A. Berg, vice-president A. G. McKee Co., Cleveland, presided at the blast furnace meeting, and H. P. Zeller, vice-president Donner-Hanna Coke Corporation, Buffalo, was chairman of the coke oven meeting. E. T. McCleary, vice-president Youngstown Sheet & Tube Co., Youngstown, was in charge of the afternoon session. C. R. Meissner, superintendent coke plant, Weirton Steel Co., Weirton, W. Va., and president of the association, presided at the dinner in the evening. There was a registration of 175.

Recent developments in gas cleaning; use of high blast temperature; relation between size of large bell and stock line diameter and its bearing on flue dust losses and what there was in pig iron, not revealed by present methods of analysis, that causes trouble in steel plants were freely discussed at the blast furnace meeting. At the joint session in the afternoon, which proved an exceedingly interesting one, coal, coke and refractories came in for a major part of the discussion. Whether zinc in refractories is a cause of their disintegration was the occasion of a real debate, with William A. Haven, superintendent northern furnaces, Republic Iron & Steel Co., taking the affirmative, and Dr. John S. Unger, Carnegie Steel Co., Pittsburgh, the negative.

Dry Cleaning of Gas Desirable

There was much discussion at the blast furnace round table of the vortex eliminator and dust catcher, which was said to be capable of taking 90 per cent of the dust out of gas running 26 grains per cubic foot of raw gas. H. S. Braman, Youngstown Sheet & Tube Co., Youngstown, gave the figures on gas cleaning at two furnaces at the Campbell works, using Kennedy whirlers as the activating units. On one furnace, 65.23 per cent of the dust was caught in the catcher, 26.11 per cent in the whirlers and 8.64 per cent in the washer and delivered to the sump. In the second furnace, on a month's observation, 70.1 per cent was caught in the catchers, 28.5 per cent in the whirlers and 1.3 per cent taken out by the washer. Dry cleaning of gas was generally admitted as desirable, because the higher percentage of dust removed dry made the washer correspondingly more efficient.

Discussion of high blast temperature brought out some difference of opinion. While several reported success with present day burdens at 1400, 1500 and 1600 deg. Fahr., it was also indicated that best success would come only when the burdens could be opened up. Eastern furnace men indicated particular success with high blasts through the use of sintered magnetic ores.

Speakers held that the small bell was too extensively blamed for some of the troubles of other years, and that now the trend is back to the small bell and to an enlarging of the stock line. A bell with a 2-ft. clearance, and the keeping of the fine ores against the brickwork, are now considered standard.

Coal and Refractory Topics

Dry cleaning of coal was described and compared with wet washing, by Mr. Affelder, Hillman Coal & Coke Co., at the joint afternoon meeting. Discussion of the melting point of coke brought out that the best coke usually results from coals of closely similar melting points. The question of the qualities of coke required for foundry and mill iron was pretty well answered by Mr. Affelder, who said that it would have to be a coke which would offset the impurities of the furnace lining, correct the ores and fluxes, offset the weather and climatic conditions, which would be flexible in cell structure and porosity and would produce a ton of pig iron on a smaller amount than, it is alleged, is being used.

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This Issue in Brief

Production control board tells at a glance the amount of work before every production machine for months in advance. Length of colored planning card indicates the number of hours the job will take.—Page 521.

Cuts costs 25 per cent by handling materials on roller and belt conveyors. Moderate-sized plant discovers it can utilize to excellent advantage mechanical handling methods employed by large mass production shops.—Page 525.

Foundry solves problem of handling molds in limited space by mounting a swinging jib crane on a pipe column erected in place of a wooden building column. The crane swings in a complete circle, serving one-half of two bays and handling molds from two machines.—Page 530.

Production delays due to tardiness in making tool set-ups are avoided by having department foreman furnish tool room, at least three hours ahead of time, with a control card showing just what set-up will be required. Tools are delivered to the department in a metal basket at least one hour before needed.—Page 522.

You can have too many shop rules. Attempting to govern the conduct of workmen in petty and inconsequential matters has an effect opposite to that desired. It is well to avoid unnecessary limitations on the freedom or initiative of the employee.—Page 552.

Pig iron price advance during the next month or two seems likely, says Dr. Haney. However, the advance will certainly be moderated by the weakness in fuel and steel scrap, he indicates.—Page 545.

Foremen are kept on important supervisory work by being relieved of the necessity of following up jobs going through department. Each foreman has a set of machine schedule cards showing just what is scheduled for each machine for two weeks in advance. These cards are checked by a clerk from the production control office, who reports delays and investigates their cause.—Page 524.

Departure from one-price policy inevitably leads to failure, says association head. Price-cutting is contrary to the interest of the buyer, for the ultimate result is inferior quality and inadequate service.—Page 531.

Fatigue failure of metals is promoted by non-metallic inclusions. Boundary between the inclusion and the metal is the path often followed by the fatigue crack, metallurgist declares.—Page 533.

Magnet steel can be reduced two-thirds in weight, without reducing the coercive force, by using a steel containing cobalt. But the high cost of this steel restricts its use to special applications.—Page 534.

High skill is required in molding chrome iron castings. Operations must be adjusted so that the alloy will not burn or cut into the sand.—Page 535.

Germans obtain high iron output from relatively moderate-size blast furnaces. As much as 1100 to 1200 tons daily is produced from a 16-ft. hearth furnace. Ability to draw upon a wide variety of ores is partly the reason.—Page 547.

Predicts wide use of nitridation to provide a superior degree of corrosion resistance to ordinary carbon steels. Metallurgist also declares that alloy steels, covered with mill scale, may be given a hard and useful case by nitrogen.—Page 538.

Cut your selling costs by confining your efforts to profitable markets. Spreading out into sparse territory promotes waste in distribution, says Dr. Klein.—Page 546.

Discourages idea of American cartels to meet threatened foreign competition. Monopoly would only result in greater Government supervision and control, says assistant to Attorney General.—Page 546.

Ammonia-hardening produces a superior case in aluminum steel containing about one-quarter per cent molybdenum, and low chromium. Brittleness at moderate temperatures is avoided, and the steel shows high resistance to abrasion.—Page 538.

Trade associations will not fall afoul of the Sherman law if they confine themselves to collecting and disseminating statistical information as to "exact existing conditions and past transactions," says Government official. They violate the law only when discussion leads to agreements as to prices, customers or allocation of territory.—Page 546.

Is instalment buying contributing heavily to the high cost of distribution? With the common citizen paying 27 per cent for money borrowed from a finance corporation, the present system of instalment buying seems wasteful.—Page 550.

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Cost of Instalment Selling

PROF. EDWIN R. A. SELIGMAN of Columbia University has written a pair of persuasive books on instalment selling, and in common phrase "gives it a clean bill of health." That is, except for a few minor and correctable abuses. On the whole, he feels that the instalment buyer gets value received for the premium he pays over the cash price, while the credit extended, both in nature and in volume, does not constitute a menace to our present banking and business system.

One hesitates to dispute so eminent an authority, but there is one aspect of instalment selling which seems so distinctly uneconomic that it is worthy of more detailed consideration. We refer to the great spread in cost of money to the commercial bank and to the instalment buyer. When John, Jerry or Henry deposits his money, the bank pays him 3 to 4 per cent for it. When John, Jerry or Henry borrows money from a finance corporation, which borrows it from a bank, he pays 27 per cent for it. In other words, the common citizen pays 24 per cent for the privilege of using his own money!

This statement may be thought to require a deal of qualification, but is it not essentially sound? The finance corporation which advances the money covering the unpaid balance on a purchase, which in turn enables the dealer to pay for his cars or refrigerators or oil burners or radios promptly, and thereby enables the maker to manufacture some more for a new wave of instalment purchases—that finance company must get the money somewhere. It has some capital stock paid in, and can get direct loans from banks on its own credit to about five times that sum, but this is nowhere near enough. It replenishes its coffers by discounting its receivables (that is, the promises to pay future instalments signed by John, Jerry and Henry) with friendly banks direct, or with a bank through some middleman, such as a larger finance company, a broker or a bonding company. When this does not procure all the money required, or the cost mounts too

high, the finance company turns over its receivables (promises to pay signed by John, Jerry and Henry) to a trust, and the trust sells short time notes, based on a constantly recurring supply of such receivables, to a bank or to the public at margins varying from 1 to 20 per cent.

This outline of the financial story emphasizes one thing: that in general the only assets which a finance company can pledge are the notes signed by the purchaser on instalments—that is, by citizens generally. The only way the finance company can get money for these assets is to sell them back to the public, either direct or through the banks (which are the depositories of that self-same public's funds and credit).

In other words, a highly complex and expensive organization has been set up to enable the common citizen to borrow his own money, and to insure him against his own recklessness either in buying or using a modish luxury, convenience or necessity.

To the extent that such an expensive intermediary may be replaced by a simpler and more direct method of financing consumers' goods, the present system of instalment buying is wasteful. The suspicion will not down that this waste, this expensive step in distribution, is taking too great a share, or relieving the citizen (for a price) of common responsibility and caution in his spending or using.

Automobile vs. Steel Profits

COMPARISONS of the large profits of some of the automobile companies with the relatively small earnings of the steel companies have been commonly made during the past year. Now comes the annual report for 1927 of the General Motors Corporation, showing profits of \$235,104,826 available for dividends as against \$87,845,456 made last year by the United States Steel Corporation, whose capital structure is comparable in size with that of General Motors.

It has often been said that many of the steel companies have given away profits in the form of

price concessions on purchases of steel by automobile companies, but this in no wise explains the enormous profits of the General Motors Corporation. Last year the automobile industry as a whole is credited with consuming nearly three and a half million tons of finished steel. If we assume that the General Motors Corporation not only paid an average of \$5 a ton more for its steel than it actually paid (which perhaps would have been a profitable level for the steel companies) and an additional sum equal to \$5 a ton for every ton of steel bought by other automobile companies, the total to be deducted from its profits would have been less than \$17,500,000. Thus more than \$200,000,000 of its profits would still have to be accounted for in other ways.

Of course, the above statement does not adequately measure the cost to the steel industry of its concessions on automobile steel, if it be assumed that a low general level of selling prices on steel is brought about in many instances by the pressure that automobile companies are able to exert by reason of their large requirements.

Fluctuating Commodity Prices

THE Bureau of Labor's index number of commodity prices at wholesale is announced at 96.3 for January, against 96.8 for December and 96.2 for January, 1927. The outstanding feature of the showing is not the steadiness in prices, which will be loosely referred to in many quarters, but the serious dangers lurking in averages. From January, 1927, to January, 1928, there is a decrease of only three-tenths of one per cent in the "average." This is an index carefully weighted according to production shown by the last census, and it is quite up to date, as all figures have been recomputed with 1926 prices as base or 100, the old system, with 1913 as base, having been abandoned after August, 1927. There is no doubt that when the general index number is unchanged the general purchasing power of the dollar is not materially changed, and that for a given volume of commodity turnover the dollar turnover is not materially changed.

But various producers have good reason to ask: "What do we get out of that?" Among such producers are those whose products are listed below, with the percentage decrease that occurred from one January to the next, computed from the Bureau of Labor's own figures:

	Per Cent Decrease
Bituminous coal	6.7
Coke	11.8
Petroleum products	29.4
Iron and steel.....	5.3
Non-ferrous metals	3.3
Building materials	6.9

It is the reverse of comfort to these producers to learn that others are securing higher prices for their goods. They cannot nourish any hope that because other things cost more the public will buy more of their goods now that they are cheaper.

An unevenly divided prosperity does few people much good, perhaps none in the long run. Certainly it is vastly inferior to a uniformly distributed prosperity. There has been much talk about sustained buying power. The total buying power is

the thing and if it is impaired in big spots something is not right.

This showing furnishes food for thought. We must not be deluded by averages. The laborer is worthy of his hire and conditions should be sought which will assist all producers to secure decent prices.

Group Progress and the Business Press

INDIVIDUALISM in industry is steadily giving way to group effort. Time was when every manufacturer regarded competitors with suspicion and jealously guarded his secrets from prying eyes. In his self esteem he did not credit others with the ability to develop equally good ideas. Today the same self-confidence helps to explain a radical change in attitude. A keen foreign observer recently quoted an American foundryman as follows: "Why shouldn't I let a competitor visit my plant? If I do not learn more from him than he gets from me, I am to blame."

The old saying that "two heads are better than one" finally is being taken seriously. There is a constant pooling of ideas both in informal conferences and in the meetings of organized associations. It is realized that there are mutual advantages in a policy of give and take; it is clearly seen that progress is expedited if many minds work collectively for the solution of business problems. Yet it is only beginning to dawn on some that the group mind of an industry functions most effectively in the business paper.

Such a publication is not merely a newspaper. It collects the diverse ideas of many individuals, and sifts, assembles and organizes them, returning them to industry in the most usable form.

There may be journals that lead an industry and others that follow it, but the trade publication is of greatest value as the best available means for collective expression. An industry serves the common welfare and thus justifies its existence only as it learns more, and makes practical use of what it learns, about its technical and economic problems. The business paper, in both its advertising and editorial pages, is a stimulus to all to contribute to, as well as to partake of, the latest, best conceived and most useful ideas of their industry.

The Short-Term Buying Regime

MARKET factors now appear to be at work that are leading away from the extremely close-range buying which for so long has been the policy of manufacturing consumers of steel. For the most part the change may be attributed to the advancing tendency of the market, due to the emphasis the producers are putting upon the folly of cutting prices to increase operation.

There have also been some efforts to discourage small-lot business by increasing quantity extras, as on hot-rolled and cold-finished bars, or by establishing separate higher base prices for smaller lots, as in the case of cold-rolled strip steel. But, as a general thing, mills have adjusted their operative organizations to a regime of many small orders and specifications and they are not releasing their hold on a business gained and held through special efforts to give the service demanded. Although order

books are well filled and specifications entered at some mills indicate delivery periods running into weeks, the small-tonnage buyer obtains and can still expect deliveries from mills that compare favorably with those of six months or a year ago.

If, in the early days of close-range buying, railroads were charged with failure in the matter of delivery, it was due in large measure to two factors: lack of cooperation among carriers entering competitive territory, and the slowness and uncertainty of package freight delivery due to the desire to concentrate on carload shipments, which net the largest return in revenue. It remained for agencies outside of buyer, seller or railroads to bring about cooperation so that package freight, and for that matter consignments by express, move to the principal centers of distribution with few transfers and with a minimum of delay.

This work has been undertaken by commerce associations in many of the large production centers. As an example, there are now moving daily out of Chicago 3000 merchandise freight cars, sealed and routed to 1800 points of distribution. The associations offer assistance to shippers in routing consignments and they invite the cooperation of railroads in competitive territory by distributing merchandise cars to the several carriers entering a given center.

Service rendered is the keynote of the situation. Railroad transportation facilities and methods are vastly improved. Hard roads have extended movement by trucks. Small orders, on which unusual dispatch is required, are now forwarded by air transport. In fact, all agencies interested have made such a thorough job of meeting market conditions as they have existed in the last few years that it would take a prolonged upward movement in prices to cause any considerable departure from the policy of short-time buying.

Coal Stocks and Consumption

A CURIOUS outcome of the failure of the bituminous coal strike of last April is that stocks at the beginning of this year were unusually large. Coal in the open market was so cheap during the months expected to constitute the strike period that holders of stocks were loath to draw upon them, feeling that they had best take advantage of the bargains continually offered.

The Bureau of Mines in a report dated Feb. 9 gives the stocks at the beginning of this year, with the usual comparisons. For a total of forty-eight dates in the past thirteen years the figures represent the stocks, either ascertained or estimated, in the hands of commercial consumers. Stocks on Jan. 1 for each recent year except 1925, are as follows:

Jan. 1 Stocks of Bituminous Coal, Net Tons
1922 48,000,000
1923 36,000,000
1924 62,000,000
1926 49,000,000
1927 55,000,000
1928 55,500,000

Even three months before the strike of April 1, 1922, there were rather large stocks and these increased to 63,000,000 tons, as a minimum estimate, on the strike date. Although resumption came late in August the stocks at the end of the

year were down by 27,000,000 tons to 36,000,000 tons.

Preparation for the 1927 strike came earlier, there being 7,000,000 tons more stock on Jan. 1, 1927, than on Jan. 1, 1922, and only the accumulation of the first three months of 1927 was liquidated during the remainder of the year. The bare figures show a half-million ton increase in the year as a whole. The April 1, 1927, stocks are given at 75,000,000 tons.

The Bureau of Mines estimate of consumption during the last three months of last year is remarkably low. The estimates are based upon production, with allowances for imports, exports and changes in stocks. Apparent consumption is given as follows:

Weekly Consumption, Last Three Months of Year, Net Tons

1923	10,080,000
1926	11,200,000
1927	9,912,000

Thus consumption in the last quarter is made 11½ per cent less than in the quarter a year previous and even a trifle under consumption in the last quarter of 1923. In a four-year interval one may count upon increasing efficiency in using coal to cover an increase in trade activity without more coal being needed, but some may doubt the decrease shown from 1926 to 1927.

Production of coal since the first of this year has been well under that in the same period of any recent year. Clearly there is no chance of demand being such as to relieve the coal industry from its present deplorable condition. The proposed Senate investigation will meet a very big subject.

How to Get Zest in Work

THE intangibles in industrial relations are frequently overlooked. This is not surprising in view of what has been accomplished through the mechanization of industry and the adoption of mechanistic systems of management. Good results are obviously obtainable from various applications of the principles of scientific management, but there is too little recognition of the human phase of the plant operation. The human side of industrial relations, however, does not mean maudlin expressions of good will toward employees or excessive outlays for "welfare" work. It implies, rather, a knowledge of human nature and the possibilities of capitalizing that knowledge.

A certain amount of discipline is essential in every plant. Improved ways of performing different operations, as disclosed by time and motion studies, are cheerfully accepted by workmen when tactfully approached. Even highly specialized tasks are regarded as unavoidable in shops engaged in mass production. But the average employee resents unnecessary limitations on his freedom or initiative.

In plants where rules govern the conduct of workmen even in petty and inconsequential matters, and where the management takes the view that eternal vigilance and constant driving are the price of satisfactory production, there can be no zest or spirit in workmanship and no pride of accomplishment. "When zest departs," said Owen D. Young in a Harvard address last year, "labor be-

comes drudgery. . . . Zest is partly a matter of physical condition, but it is also largely influenced by mental reactions."

Zest in workmanship is primarily dependent on the general atmosphere in a given plant. While it may be encouraged by better foremanship, it

depends mainly on the attitude of the managing heads of the organization. A slave driver gets the production of slaves. Management that recognizes the psychology of freedom-loving men and women reaps its reward in the intelligence and zest with which they perform their tasks.

To Organize Pressed Metal Association According to Group Interests

Preliminary steps toward the organization of an association of pressed metal manufacturers were taken at a recent meeting at Cleveland. A meeting to consider the adoption of a permanent form of organization will be held at the Cleveland Athletic Club, Cleveland, on Feb. 28, as reported in *THE IRON AGE* of Feb. 16. Those who were present at the preliminary conference were:

F. H. Seither, treasurer Defiance Pressed Steel Co., Defiance, Ohio.

G. F. Conway, vice-president and treasurer Lansing Stamping Co., Lansing, Mich.

J. Bingham, president, and W. H. Schomburg, vice-president Bingham Stamping Co., Toledo, Ohio.

H. C. Nelson, Globe Machine & Stamping Co., Cleveland.

F. J. Flach, president Metal Specialty Co., Cincinnati.

E. R. Wagner, E. R. Wagner Mfg. Co., North Milwaukee, Wis.

Robert C. Yates, Transue & Williams S. F. Corporation, Alliance, Ohio.

H. F. Millman, Geuder, Paeschke & Frey Co., Milwaukee.

H. S. Johnson and R. R. Braggins, Bossert Corporation, Utica, N. Y.

E. I. Dail, Dail Steel Products Co., Lansing, Mich. George W. Schreck, Kales Stamping Co., Detroit. George F. Sparks, Truscon Steel Co., Youngstown. Lee O. Benner, Motor Wheel Corporation, Lansing, Mich.

H. B. Ranney, Bettcher Stamping & Mfg. Co., Cleveland.

W. W. Galbreath, president Youngstown Pressed Steel Co., Warren, Ohio.

E. W. Hamlin, Akron-Selle Co., Akron, Ohio.

At the preliminary meeting W. W. Galbreath, president Youngstown Pressed Steel Co., was elected temporary chairman. There was a discussion of the general condition of the industry, of the problems which face it and of the possibility of solving some of these problems through cooperative effort and discussion. Every person present took part in the discussion. The sentiment in favor of the organization of a pressed metal association was unanimous.

The general opinion seemed to be that much could be accomplished if it were possible to group the different plants, so that those having common interest could meet at regular intervals where most convenient. The organization committee (Messrs. Baird, Benner, Bingham, Flach, Galbreath and Johnson) was appointed to work in the problem of the proper grouping of the different plants, so that an association could be formed built up on these groups, rather than on a general association, which naturally could discuss only general problems.

In view of the large number of stamping manufacturers in the United States, and their great variety of products, it is obviously impossible to reach all in the short time before the organization meeting. Many have been reached, but the organization committee extends a cordial invitation to any pressed metal manufacturer to attend the Feb. 28 meeting in Cleveland. Malcomb Baird, 232 Delaware Avenue, Buffalo, is serving as secretary.

The Columbia Steel Corporation recently started a new battery of 23 Koppers-Becker by-products coke ovens at Provo, Utah. The work was completed in exactly 29 weeks from the day of the arrival on the job of the superintendent of construction. An addition to the by-product recovery plant also was made. The new battery gives the company a total of 56 ovens, capable of producing 400,000 tons of metallurgical coke annually.

Industry's Problems to Be Discussed at Conference in Cincinnati

Vital economic problems affecting American industry will be discussed at a round table conference in Cincinnati March 1 and 2 under the joint auspices of the Cincinnati branch of the National Metal Trades Association and the National Industrial Conference Board. The relation between wages and prices, the agricultural problem and an approach to its solution, and public expenditures and their bearing upon taxation are among the subjects to be discussed. The conference will be conducted by Magnus W. Alexander, president of the National Industrial Conference Board. Speakers will include Virgil Jordan, chief economist of the board; William J. Shultz, financial economist; Charles Nagel of St. Louis, J. A. Morford, industrial relations expert of the board, and Mr. Alexander. The conference will open with a luncheon meeting, and the Cincinnati branch of the National Metal Trades Association will hold its annual business session and election of officers at 5 p. m. A dinner will follow at which E. A. Muller, president King Machine Tool Co. and president of the Cincinnati branch, will preside.

Purchasing Agent's Committee on Iron and Steel Appointed

The National Association of Purchasing Agents has appointed an enlarged iron and steel committee representing five regions, of which Canada is one, which shall have the following for its objects: To further the use of standard specifications in the buying and selling of iron and steel scrap and to work with scrap dealers and producers to perfect these specifications; to urge producers and distributors of pig iron in perfecting and endorsing the pig iron contract, and to cooperate with the Department of Commerce and trade associations in improving conditions in the iron and steel field. The personnel of the new committee is as follows:

National chairman—C. R. Ramage, Diamond Chain & Mfg. Co., Indianapolis.

Pacific Coast Region—Malcolm McPhee, Pacific Coast Coal Co., Seattle (chairman); H. W. Christensen, Llewellyn Iron Works, Los Angeles; J. S. Gabriel, Denver & Rio Grande Western R.R., Salt Lake City; R. H. Petillon, Western Pipe & Steel Co., San Francisco.

Southern Region—E. B. Corbett, Harrisburg Pipe & Pipe Bending Co., Houston, Tex. (chairman); P. J. Oliver, Mexican Gulf Oil Co., Tampico, Mex.; Charles T. Doerr, Alabama Power Co., Birmingham.

North Central Region—A. J. Copeland, Industrial Brownhoist Corporation, Bay City, Mich. (chairman); Walter Wenzel, Vilter Mfg. Co., Milwaukee; L. E. Jones, Heywood-Wakefield Co., Chicago; E. H. Cordes, Stacey Mfg. Co., Cincinnati; H. C. Wickline, Union Steel Casting Co., Pittsburgh; J. A. Dwyer, C. G. Spring & Bumper Co., Detroit.

Eastern Region—B. C. Sawyer, Bethlehem Fabricators, Inc., Bethlehem, Pa. (chairman); F. M. Roos, Consolidated Car Heating Co., Albany, N. Y.; A. P. Hickcox, Scovill Mfg. Co., Waterbury, Conn.; M. G. L. Harris, Standard Gas Equipment Corp., Jersey City, N. J.

Canadian Region—T. G. Elliott, Babcock-Wilcox & Goldie McCulloch, Galt, Ontario (chairman); J. R. Hoyle, Canadian Vickers, Ltd., Montreal; M. K. McGuffie, Sheet Metal Products Co., Toronto.

Western Malleables, Inc., 332 South Michigan Avenue, Chicago, has been incorporated and has purchased all the properties, good-will and equipment of the Western Malleables Co., whose plant is at Beaver Dam, Wis. The foundry has a daily capacity of 75 tons of finished castings. The property covers 16 acres and buildings provide 300,000 sq. ft. of floor space. Officers are: A. D. Johnson, president; C. A. Starkweather, vice-president; H. L. Kirsh, vice-president and general manager, and R. J. Klatts, secretary and treasurer.

Iron and Steel Markets

Specifications Balance Output

Mill Bookings Gain Little Except at Chicago—Prices Await

Test of Second Quarter Buying—Pig Iron More

Active—Mixed Situation in Scrap

STEEL production is holding its recent gains and is perhaps a shade higher than a week ago. In most districts output and shipping orders are virtually on a parity, so that mill backlogs have ceased to expand. Operating schedules of Steel Corporation plants are unchanged at about 90 per cent of capacity, but some of the independent mills, notably at Youngstown, have increased production. Operations in the Pittsburgh-Youngstown area now average fully 80 per cent, as compared with 75 per cent at the close of January.

Consumers are specifying liberally against contracts placed at prices below those now quoted. There continues to be some concern lest buyers take shipments in excess of consumption and carry stocks of material well into the second quarter. At Cleveland, however, pressure for prompt deliveries indicates that specifications are in close step with current needs, and that supplies are not being accumulated. At Chicago there is not only a good volume of specifications against past obligations, but also considerable fresh buying, sales during the week having been exceeded only twice since Jan. 1. A further growth of mill backlogs there is reflected by extending deliveries.

From Chicago also come the first signs of interest in second quarter requirements, particularly in sheets, contracts for which have been placed at prevailing prices. In other markets present mill quotations remain largely untested. Some of the motor car builders have tried to obtain concessions from the recently advanced price on automobile body sheets, and one large company, failing to get a better quotation on its second quarter requirements, bought for the month of April only. On the other hand, irregular prices on galvanized sheets for early shipment are reported from Cleveland and the South. Prices on plates, shapes and bars are firm at 1.85c., Pittsburgh, on such new business as is being placed, and buyers are confident that they will be given an opportunity to cover their second quarter needs before any further advance is made.

Automobile consumption of steel continues to increase, but at a gradual rate. Motor car manufacturers have taken heavy orders from dealers, but it will be some time before the extent of demand from car users will be disclosed.

Fresh demand for structural steel is large, but recent bookings were not well distributed, fabricators in some districts being short of sizable work while others with large contracts, notably in the Chicago district, lack small tonnages to round out their schedules. New inquiries call for 44,000 tons. In addition, three large buildings to be erected in New York, taking a total of 50,000 tons,

will soon be in the market. At Pittsburgh, 10,000 tons of plates and shapes will be needed for 66 barges. Projects closed in the week totaled 20,000 tons.

Rail mills have enough tonnage booked to keep them engaged for several months. There is still fair demand for track accessories, purchases from Chicago mills amounting to 6000 tons.

Railroad equipment buying has not developed to the extent that the steel trade had looked for. The week's principal orders were 2000 box car bodies for the Baltimore & Ohio and 500 flat cars for the Union Pacific. Bids have gone in on 2000 refrigerator cars for the Pacific Fruit Express.

Overproduction of oil is adversely affecting business in drill and drive pipe, but a fair tonnage of plates for storage tanks continues to be bought for Southwestern fields. An inquiry for 100,000 tons of pipe for a gas line from Amarillo, Tex., to Kansas City, Mo., is now before the mills.

Tin plate demand has been enlivened by inquiries for 100,000 boxes from a domestic oil producer and for 60,000 boxes from a Japanese oil company.

Pig iron business is active in Chicago, Cleveland, St. Louis and the South, but is exceedingly quiet at Pittsburgh, in the Valleys and in eastern Pennsylvania. Cleveland sales were 53,000 tons, 11,000 tons was taken by a St. Louis district producer, and one interest in Alabama has booked 25,000 tons. Two New England consumers of basic iron have taken a total of about 15,000 tons. Shipments of iron by Chicago merchant furnaces are in excess of production and yard stocks are being reduced. A Cleveland producer has advanced its price 50c. a ton, but in other districts there is no upward movement.

Steel mill grades of scrap are 50c. a ton higher at Chicago on sales of 15,000 tons, but in general the scrap market has not reflected the recent increase in steel production.

Orders for fabricated structural steel in January are computed at 213,750 tons, or 57 per cent of capacity, representing a sharp drop from 258,750 tons (69 per cent) in December and making the smallest month since January, 1927. Total orders for the year 1927 are placed at 3,060,000 tons, the largest for any year on record.

Both of THE IRON AGE composite prices are unchanged this week, that for pig iron remaining for a second week at \$17.75 a ton and that for finished steel for a second week at 2.364c. a lb. The finished steel composite is almost precisely the same as the 2.367c. of one year ago, but pig iron is \$1.21 below the \$18.96 of a year ago.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:		Feb. 21, 1928	Feb. 14, 1928	Jan. 24, 1928	Feb. 21, 1927
No. 2 fdy., Philadelphia	\$20.76	\$20.76	\$20.26	\$21.76	
No. 2, Valley furnace	17.25	17.25	17.25	18.50	
No. 2, Southern, Cin'ti.	19.69	19.69	19.69	21.69	
No. 2, Birmingham	16.00	16.00	16.00	18.00	
No. 2 foundry, Chicago*	18.50	18.50	18.50	20.00	
Basic, del'd eastern Pa.	19.50	19.50	19.50	21.00	
Basic, Valley furnace	17.00	17.00	17.00	18.00	
Valley Bessemer, del. P'gh	19.26	19.26	19.26	20.76	
Malleable, Chicago*	18.50	18.50	18.50	20.00	
Malleable, Valley	17.25	17.25	17.25	18.50	
Gray forge, Pittsburgh	18.51	18.51	18.51	19.76	
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04	
Ferromanganese, furnace	100.00	100.00	100.00	100.00	

Rails, Billets, Etc., Per Gross Ton:		O-h. rails, heavy, at mill	\$43.00	\$43.00	\$43.00
Light rails at mill	36.00	36.00	36.00	36.00	
Bess. billets, Pittsburgh	33.00	33.00	33.00	33.00	
O-h. billets, Pittsburgh	33.00	33.00	33.00	33.00	
O-h. sheet bars, P'gh.	34.00	34.00	34.00	34.00	
Forging billets, P'gh.	38.00	38.00	38.00	40.00	
O-h. billets, Phila.	38.30	38.30	38.30	38.30	
Wire rods, Pittsburgh	44.00	42.00	42.00	43.00	
Skelp, grvd. steel, P'gh, lb.	Cents 1.85	Cents 1.85	Cents 1.80	Cents 1.90	

Finished Iron and Steel,

Per Lb. to Large Buyers:		Cents	Cents	Cents	Cents
Iron bars, Philadelphia		2.12	2.12	2.12	2.12
Iron bars, Chicago		1.90	1.90	1.90	2.00
Steel bars, Pittsburgh		1.85	1.85	1.80	1.90
Steel bars, Chicago		1.95	1.95	1.90	2.00
Steel bars, New York		2.19	2.19	2.14	2.24
Tank plates, Pittsburgh		1.85	1.85	1.80	1.85
Tank plates, Chicago		1.95	1.95	1.90	2.00
Tank plates, New York		2.17 1/2	2.17 1/2	2.12 1/2	2.19
Beams, Pittsburgh		1.85	1.85	1.80	1.90
Beams, Chicago		1.95	1.95	1.90	2.00
Beams, New York		2.14 1/2	2.14 1/2	2.09 1/2	2.19
Steel hoops, Pittsburgh		2.20	2.20	2.20	2.20

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Steel Buyers Taking Shipments Freely— Ingot Output Averages 80 Per Cent

PITTSBURGH, Feb. 20.—From the standpoint of steel works and rolling mill operations and demand as typified by specifications against contracts, the steel situation leaves little to be desired. As a result of some increase in the operations of the Youngstown district, the general average of the Greater Pittsburgh district in steel ingot production is now easily 80 per cent of capacity. The freedom with which consumers are taking shipments against their orders suggests no immediate recession from that rate, especially as invoice prices on present shipments are generally below those manufacturers are now quoting. The unfavorable feature of the situation at the moment is that consumers are placing most of their dependence upon the steel they have on order and are not yet showing much interest in second quarter requirements. Views as to prospects are more moderate in some quarters than they were in January.

With the possible exception of pipe, steel makers have good-sized order books in all products. Evidence is still lacking that outside of the motor car industry there has been as much of a gain in consumption among the industries drawing on Pittsburgh for their steel as was indicated in some of the forecasts made in December and in the early weeks of this year.

Railroad car builders in this territory do not appear to have fared as well as those in the Central West.

Sheets, Nails and Wire, Per Lb. to Large Buyers:

	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.90	2.90	2.80	2.75
Sheets black, No. 24 Chicago dist. mill	3.00	3.00	3.00	2.90
Sheets galv. No. 24, P'gh.	3.65	3.65	3.65	3.65
Sheets, galv., No. 24, Chicago dist. mill	3.85	3.85	3.85	3.85
Sheets, blue, 9 & 10, P'gh.	2.10	2.10	2.10	2.20
Sheets, blue, 9 & 10, Chicago dist. mill	2.20	2.20	2.20	2.30
Wire nails, Pittsburgh	2.65	2.65	2.55	2.55
Wire nails, Chicago dist. mill	2.70	2.70	2.55	2.60
Plain wire, Pittsburgh	2.50	2.50	2.40	2.40
Plain wire, Chicago dist. mill	2.55	2.55	2.45	2.45
Barbed wire, galv., P'gh.	3.35	3.35	3.25	3.25
Barbed wire, galv., Chicago dist. mill	3.40	3.40	3.25	3.30
Tin plate, 100 lb. box, P'gh	\$5.25	\$5.25	\$5.25	\$5.50

Old Material, Per Gross Ton:

	Feb. 21, 1928	Feb. 14, 1928	Jan. 24, 1928	Feb. 21, 1927
Heavy melting steel, P'gh.	\$15.00	\$15.00	\$15.00	\$16.00
Heavy melting steel, Phila.	13.50	13.50	13.50	14.50
Heavy melting steel, Ch'go	13.00	12.50	12.50	12.75
Carwheels, Chicago	14.00	14.00	14.00	15.00
Carwheels, Philadelphia	15.50	15.50	15.50	16.00
No. 1 cast, Pittsburgh	14.50	14.50	14.50	15.75
No. 1 cast, Philadelphia	16.00	16.00	16.00	17.00
No. 1 cast, Ch'go (net ton)	14.50	14.50	14.50	16.50
No. 1 RR. wrot., Phila.	15.00	15.00	15.25	17.00
No. 1 RR. wrot. Ch'go (net)	11.50	11.00	11.00	12.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt	\$2.75	\$2.75	\$2.65	\$3.50
Foundry coke, prompt	3.75	3.75	3.75	4.50

Metals,

Per Lb. to Large Buyers:		Cents	Cents	Cents	Cents
Lake copper, New York		14.25	14.25	14.25	13.12 1/2
Electrolytic copper, refinery		13.82 1/2	13.87 1/2	13.87 1/2	12.75
Zinc, St. Louis		5.47 1/2	5.60	5.65	6.85
Zinc, New York		5.82 1/2	5.95	6.00	7.20
Lead, St. Louis		6.07 1/2	6.12 1/2	6.30	7.30
Lead, New York		6.32 1/2	6.35	6.50	7.40
Tin (Straits), New York		51.50	51.87 1/2	55.37 1/2	70.25
Antimony (Asiatic), N. Y.		10.87 1/2	11.00	11.00	14.25

Structural steel business also has been better for mills outside rather than in the Pittsburgh district. The oil industry, a recovery in which would mean much to Pittsburgh in pipe business, is yet to make real headway in correcting the over-supply situation. Conditions generally are much more favorable in the Chicago district, but, on the other hand, the East, according to local advices, is not doing so well as Pittsburgh.

Automobile companies have been trying to get concessions from the recently announced price on body sheets, but do not seem to have had success, although it is rather significant that one large company, which failed to get a lower price on its entire requirements for the second quarter, decided to order only for April.

Primary materials are very dull, with steel works scrap showing some tendency toward weakness. Coke and coal are quotable at unchanged prices, but are weaker.

Pig Iron.—Merchant pig iron producers have little reason to feel cheerful about the market. While consumers are taking shipments against old orders fairly freely, their fresh requirements are few and small. The trade has before it the inquiry of the Westinghouse Electric & Mfg. Co., which may reach fair-sized proportions, though no specific tonnage is mentioned. Otherwise, inquiries are entirely for carloads. The Edge-water Steel Co. was a recent buyer of about 5000 tons of basic iron at a price below what it would have had to pay if the iron had come from a Valley furnace. The iron was sold by a steel works having a much lower freight rate. The Carnegie Steel Co. recently added a blast furnace at Mingo, Ohio, and one at New Castle, Pa., to its active list, making a total of 10 stacks this company has put on since Jan. 1, and giving it

32 in production of a total of 51. The Stewart Furnace Co., Sharon, Pa., is about to blow out its furnace.

Prices per gross ton, f.o.b. Valley furnace:

Basic	17.00
Bessemer	17.50
Gray forge	16.75
No. 2 foundry	17.25
No. 3 foundry	16.75
Mailable	17.25 to 17.50
Low phosphorus, copper free	27.00

Freight rate to the Pittsburgh or Cleveland district, \$1.75.

Ferroalloys.—Ferromanganese is moving a little more freely on contracts. Consumers appear to have pretty well reduced their stocks and the increased rate of steel production means a larger consumption. Spiegeleisen continues to move well on old orders, but new business amounts to little. Consumers are specifying well for high-grade ferrosilicon, although tonnages moving to the Youngstown district show some recession as compared with those of January. Prices are unchanged.

Semi-Finished Steel.—Chicago interests recently were seeking prices on 10,000 tons each of 4-in. and 1 1/4-in. billets for shipment to the Chicago district, but prices quoted here were too high to take the business away from Chicago district producers. Otherwise open market activity in semi-finished steel has been limited, but there continues to be a fairly good movement on specifications to sheet, tin plate and strip makers from their regular sources of supply. The Chicago inquiry developed a waiver of the size extra on small billets by some makers, but in general prices are holding well, and on wire rods all local producers now are quoting \$44, base Pittsburgh or Cleveland. Sales at that price are few and small, because there was such extensive covering of consumers for this quarter at prices \$2 to \$4 a ton less.

Bars, Plates and Shapes.—Approximately 5000 tons of structural steel is pending in Pittsburgh district building projects and 10,000 tons of plates and small shapes will be needed in 66 barges now before fabricators for bids. Fabricated steel lettings of the past week show some increase in number, but tonnages run small, and complaint again is heard of sharp price competition. There continues to be steady specifying against old orders for plates and shapes, but strictly new business is not yet of sizable proportions. The mills are firm at 1.85c., base, for shapes and plates, and small lot sales are fairly numerous at that price. Specifications for bars continue to flow in steadily and in good volume. On new bar orders makers are holding firmly to 1.85c., base. Reinforcing bars wait on open weather for activity.

Rails and Track Supplies.—Standard-section rail bookings are sufficient to keep the mills busy for several months, provided the roads do not revise original estimates of their requirements. Light-section rails are not doing much on account of the curtailment of coal mining operations. Only a fair demand is noted for spikes and other track accessories. Prices are unchanged.

Wire Products.—All makers are quoting nails at \$2.65 per keg, base Pittsburgh, plain wire at \$2.50 per 100 lb., base, and other wire products at the higher prices announced on Jan. 25 last, and on such new business there is, no deviation from that schedule is observed. There is not much new business, however, since buyers were covered pretty fully for this quarter prior to the advance; they are specifying so steadily against those coverages that there is some concern that mill shipments are in excess of actual consumption and that stocks in second hands may be sufficient to lighten orders for the second quarter. Jobbers are known to have pretty heavy stocks of nails.

Tubular Goods.—Pipe makers are well satisfied with the movement of butt-welded pipe, but still report a slow movement of lap-welded, which does not appear to be sharing in the demand for drill and drive pipe and casing from California, where oil well drilling is more active at present than in any of the other producing fields. The oil situation is not improving rapidly enough to encourage hopefulness over the prospect for well pipe. The line pipe outlook, however, still is promising. All makers having mills large enough now have the inquiry for the gas line to run from Amarillo, Tex., to Kansas City, Mo. There are 400 miles of main line calling for 20-in., 22-in. and 24-in. pipe, and approximately 300 miles of smaller sizes for feeder and distributing lines, and the steel will amount to about 100,000 tons. Formal inquiry for the Monroe, La.-St. Louis gas line is yet to be made. Pipe prices continue to show some irregularity despite efforts to stabilize them. Fairly good demand is noted for locomotive tubes. Mechanical tubing is going out very steadily.

Tin Plate.—Container manufacturers, most of whom have contracted for their requirements for the first half of the year, are specifying steadily and mill operations continue at around 80 per cent of capacity. There is little business outside of contract obligations.

Cold-Finished Steel Bars and Shafting.—Consumers continue to take shipments against first quarter contracts, but demands otherwise are few and small, and no second quarter tonnages yet are under negotiation. Most of the shipments carry a price of 2.20c., base, Pittsburgh or Chicago, with occasional small lots going at 2.30c., which makers probably will name on second quarter contracts.

Hot-Rolled Flats.—There has been almost general adoption of the price schedule announced a week ago, but not much business is being done at the new prices, which, while effective immediately, were primarily intended to rule on second quarter business. Consumers generally are covered against their needs for this quarter and are taking shipments very steadily.

Cold-Rolled Strips.—Good movement against contracts for this quarter still is noted. The higher base price announced Jan. 25 has not yet had a serious test, as buyers were previously well covered for this quarter and they are not yet showing much interest in their needs for the second quarter.

THE IRON AGE Composite Prices

Finished Steel

Feb. 20, 1928, 2.364c. a Lb.

One week ago	2.364c.
One month ago	2.314c.
One year ago	2.367c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 86 per cent of the United States output of finished steel.

High

1928	2.364c.	Feb. 14	2.314c.	Jan. 3
1927	2.453c.	Jan. 4	2.293c.	Oct. 25
1926	2.453c.	Jan. 5	2.403c.	May 18
1925	2.560c.	Jan. 6	2.396c.	Aug. 18
1924	2.789c.	Jan. 15	2.460c.	Oct. 14
1923	2.824c.	Apr. 24	2.446c.	Jan. 2

Low

Pig Iron

Feb. 20, 1928, \$17.75 a Gross Ton

One week ago	\$17.75
One month ago	17.67
One year ago	18.96
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High

1928	\$17.75	Feb. 14	\$17.54	Jan. 3
1927	19.71	Jan. 4	17.54	Nov. 1
1926	21.54	Jan. 5	19.46	July 13
1925	22.50	Jan. 13	18.96	July 7
1924	22.88	Feb. 26	19.21	Nov. 3
1923	30.86	Mar. 20	20.77	Nov. 20

Low

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

Base Per Lb.

F.o.b. Pittsburgh mills	1.85c.
F.o.b. Chicago	1.95c. to 2.05c.
Del'd Philadelphia	2.17c.
Del'd New York	2.19c.
Del'd Cleveland	2.04c.
F.o.b. Cleveland	1.85c.
F.o.b. Lackawanna	1.95c.
F.o.b. Birmingham	2.10c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills	1.90c. to 1.95c.
F.o.b. Birmingham	2.05c. to 2.15c.

Rail Steel

F.o.b. mills east of Chicago district	1.75c.
F.o.b. Chicago Heights mill	1.80c.

Iron

Common iron, f.o.b. Chicago	1.90c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

Base Per Lb.

F.o.b. Pittsburgh mills	1.85c.
F.o.b. Chicago	1.95c. to 2.05c.
F.o.b. Birmingham	2.10c.
Del'd Cleveland	2.04c.
Del'd Philadelphia	2.10c.
F.o.b. Coatesville	2.00c.
F.o.b. Sparrows Point	2.00c.
F.o.b. Lackawanna	1.95c.
Del'd New York	2.17c.
C.i.f. Pacific ports	2.30c.

Structural Shapes

Base Per Lb.

F.o.b. Pittsburgh mills	1.85c.
F.o.b. Chicago	1.95c. to 2.05c.
F.o.b. Birmingham	2.10c.
Del'd Cleveland	2.04c.
Del'd Philadelphia	2.10c.
F.o.b. Coatesville	2.00c.
F.o.b. Sparrows Point	2.00c.
F.o.b. Lackawanna	1.95c.
Del'd New York	2.17c.
C.i.f. Pacific ports	2.30c.

Hot-Rolled Flats (Hoops, Bands and Strips)

Base Per Lb.

Gages narrower than 3 in., P'gh	2.20c. to 2.40c.
Gages wider than 3 in. to 6 in., P'gh	2.10c. to 2.20c.
Gages 6 in. and wider, P'gh	1.90c. to 2.00c.
All gages, narrower than 6 in., Chicago	2.30c. to 2.50c.
All gages, 6 in. and wider, Chicago	2.00c. to 2.10c.

*Mills follow plate or sheet prices according to gage on wider than 12 in.

Cold-Finished Steel

Base Per Lb.

Bars, f.o.b. Pittsburgh mills	2.20c. to 2.30c.
Bars, f.o.b. Chicago	2.20c. to 2.30c.
Bars, Cleveland	2.25c. to 2.35c.
Shafting, ground, f.o.b. mill	2.45c. to 2.90c.
Strips, under 12 in., 1 up to 3 tons, P'gh	3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, Cleveland	3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, del'd Chicago	3.30c. to 3.45c.
Strips, under 12 in., 1 up to 3 tons, Worcester	3.25c. to 3.40c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

Base Per Keg

Wire nails	\$2.65
Galvanized nails	4.65
Galvanized staples	3.35
Polished staples	3.10
Cement coated nails	2.65

Base Per 100 Lb.

Bright plain wire, No. 9 gage	\$2.50
Annealed fence wire	2.65
Spring wire	3.50
Galv'd wire, No. 9	3.10
Barbed wire, galv'd	3.35
Barbed wire, painted	3.10

Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., (wire) mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh	\$65.00
F.o.b. Cleveland	65.00
F.o.b. Anderson, Ind.	66.00
F.o.b. Chicago district mills	67.00
F.o.b. Duluth	68.00
F.o.b. Birmingham	68.00

Sheets

Blue Annealed

Base Per Lb.

Nos. 9 and 10, f.o.b. Pittsburgh	2.10c. to 2.20c.
Nos. 9 and 10, f.o.b. Chicago dist. mill	2.20c. to 2.30c.
Nos. 9 and 10, del'd Cleveland	2.29c.
Nos. 9 and 10, del'd Philadelphia	2.42c. to 2.52c.
Nos. 9 and 10, f.o.b. Birmingham	2.25c. to 2.30c.

Box Annealed, One Pass Cold Rolled

Base Per Lb.

No. 24, f.o.b. Pittsburgh

No. 24, f.o.b. Chicago dist. mill

No. 24, f.o.b. Cleveland

No. 24, f.o.b. Philadelphia

No. 24, f.o.b. Birmingham

Base Per Lb.

No. 24, f.o.b. Pittsburgh, A grade

No. 24, f.o.b. Pittsburgh, B grade

Metal Furniture Sheets

Base Per Lb.

No. 24, f.o.b. Pittsburgh

No. 24, f.o.b. Chicago dist. mill

No. 24, f.o.b. Cleveland

No. 24, f.o.b. Philadelphia

No. 24, f.o.b. Birmingham

Automobile Body Sheets

Base Per Lb.

No. 20, f.o.b. Pittsburgh

Long Ternes

Base Per Lb.

No. 24, 8-lb. coating, f.o.b. mill primes

Base Per Lb.

Tin Mill Black Plate

Base Per Lb.

No. 28, f.o.b. Pittsburgh

No. 28, f.o.b. Chicago dist. mill

Terne Plate

Base Per Lb.

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating I.C. \$11.20

15-lb. coating I.C. 14.00

20-lb. coating I.C. 15.30

40-lb. coating I.C. 19.85

Alloy Steel Bars

Base Per 100 Lb.

2100* (1/2% Nickel, 0.10% to 0.20% Carbon)

2300 (3 1/2% Nickel)

2500 (5% Nickel)

3100 (Nickel Chromium)

3200 (Nickel Chromium)

3300 (Nickel Chromium)

3400 (Nickel Chromium)

5100 (Chromium Steel)

5200* (Chromium Steel)

6100 (Chrom. Vanadium bars)

9250 (Silicon Manganese spring steel)

Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.)

Nickel Chrom. Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)

Chromium Molybdenum bars (0.80-1.10 Chrom., 0.25-0.40 Molyb.)

Chromium Molybdenum bars (0.50-0.70 Chrom., 0.15-0.25 Molyb.)

Chromium Molybdenum spring steel (1-1.25 Chrom., 0.30-0.50 Molybdenum)

Base Per 100 Lb.

2100* (1/2% Nickel, 0.10% to 0.20% Carbon)

2300 (3 1/2% Nickel)

2500 (5% Nickel)

3100 (Nickel Chromium)

3200 (Nickel Chromium)

3300 (Nickel Chromium)

3400 (Nickel Chromium)

5100 (Chromium Steel)

5200* (Chromium Steel)

6100 (Chrom. Vanadium bars)

9250 (Silicon Manganese spring steel)

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9250 (Silicon Manganese spring steel)

Base Per 100 Lb.

2100* (1/2% Nickel, 0.10% to 0.20% Carbon)

2300 (3 1/2% Nickel)

2500 (5% Nickel)

3100 (Nickel Chromium)

3200 (Nickel Chromium)

Old Material.—Business is very slow and such changes as there have been in prices have not been uniform. Heavy melting steel now is quotable at \$14.50 to \$15; there have been no sales to consumers at less than the higher figure, but dealers are able to buy against short sales at one point in the district at \$14.50, and \$15 is as high as they will go on purchases for other points where there are uncovered sales at higher prices. On the other hand, No. 2 wrought, which ordinarily sells at the same level as heavy melting steel, now is at a premium because of bids by dealers who are short against sales made a few weeks ago. Dealers are keeping up the market on scrap rails by purchases against short sales. Cast iron wheels are stronger and heavy breakable cast scrap has been sold at a slight advance over recent prices. Machine shop turnings have been sold into consumption at \$11.25. The recent advance in compressed and bundled sheets has not held.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Furnace Grades:	
Heavy melting steel	\$14.50 to \$15.00
Scrap rails	14.50
Compressed sheet steel	14.00 to 14.25
Bundled sheets, sides and ends	13.00 to 13.25
Cast iron earwheels	14.50 to 15.00
Sheet bar crops, ordinary	15.00 to 15.50
Heavy breakable cast	13.50 to 14.00
No. 2 railroad wrought	15.00 to 15.50
Heavy steel axle turnings	13.00 to 13.50
Machine shop turnings	11.00 to 11.25

Acid Open-Hearth Furnace Grades:	
Railroad knuckles and couplers	16.75 to 17.00
Railroad coil and leaf springs	16.75 to 17.00
Rolled steel wheels	16.75 to 17.00
Low phosphorus billet and bloom ends	18.50 to 19.00
Low phosphorus, mill plate	17.50 to 18.00
Low phosphorus, light grade	16.50 to 17.00
Low phosphorus sheet bar crops	17.50 to 18.00
Heavy steel axle turnings	13.00 to 13.50

Electric Furnace Grades:	
Low phosphorus punchings	16.50 to 17.00
Heavy steel axle turnings	13.00 to 13.50

Blast Furnace Grades:	
Short shoveling steel turnings	11.00 to 11.50
Short mixed borings and turnings	11.00 to 11.50
Cast iron borings	11.00 to 11.50
No. 2 busheling	10.00 to 10.25

Rolling Mill Grades:	
Steel car axles	18.00 to 19.00
No. 1 railroad wrought	11.00 to 11.50
Sheet bar crops	17.00 to 17.50

Cupola Grades:	
No. 1 cast	14.50 to 15.00
Rails 3 ft. and under	15.00 to 15.25

Malleable Grades:	
Railroad	14.50 to 15.00
Industrial	14.00 to 14.50
Agricultural	13.50 to 14.00

Sheets.—Business conditions still vary. Reports from the Central West indicate a good movement against first quarter contracts and also a willingness to sign up for second quarter, but there does not seem to be the same anxiety for supplies on the part of con-

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.60c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24 gage), 25 or more bundles	3.65c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.50c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.10c.
Galvanized corrugated sheets (No. 28 gage), per square	\$4.39
Spikes, large	3.30c. to 3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count	62½ per cent off list
Machine bolts, per 100 count	62½ per cent off list
Carriage bolts, per 100 count	62½ per cent off list
Nuts, all styles, per 100 count	62½ per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black soft annealed, base per 100 lb.	\$3.00 to 3.10
Wire, galvanized soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

sumers in other sections of the country. While there is interest in second quarter tonnages on the part of automobile builders and some business in body sheets has been written at the new price of 4.15c., base Pittsburgh, others are resisting that price, which is an advance of \$3 a ton over the current invoice price. One large user has bought only for April. Prices indicate a stronger tendency on the part of producers to get prices that will yield a fair profit in preference to full order books at unprofitable prices. It is said that current demands do not warrant more than an 80 per cent operation of the mills, and the general average of mill engagement is at about that rate.

Bolts, Nuts and Rivets.—Not much change is noted in the character or volume of business. Buyers still are ordering steadily, but not very far ahead of their requirements. Prices are firm.

Coal and Coke.—Standard furnace coke still is held at \$2.75 per net ton at ovens, but the market is not overly strong, and sales of some coke of that grade, released through the suspension of shipments by a Valley furnace, have been made at \$2.50. This was really a distress sale and the coke went for heating purposes, but it is probable that if there was a demand from furnaces, less than \$2.75 could be done. Foundry coke is just about steady. Coal prices though unchanged are weaker as there is too much offered to be readily or easily absorbed.

Detroit Scrap Market Weak

DETROIT, Feb. 20.—Some declines were registered in the scrap market in this district during the past week, notably on heavy melting and shoveling steel and long turnings.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Heavy melting and shoveling steel	\$11.50 to \$12.00
Borings and short turnings	8.75 to 9.25
Long turnings	7.50 to 8.00
No. 1 machinery cast	14.50 to 15.50
Automobile cast	18.50 to 20.00
Hydraulic compressed sheets	10.50 to 11.00
Stove plate	11.50 to 12.50
No. 1 busheling	9.50 to 10.00
Sheet clippings	7.50 to 8.00
Flashings	9.75 to 10.25

Shipment of Steel Barrels Better in January, but Still Low

WASHINGTON, Feb. 18.—Steel barrels to the number of 475,906 were manufactured in January, against 444,227 in December, according to reports received by the Department of Commerce from 27 companies owning or operating 31 plants. Except for December, the January total was the smallest for any month in two years. Unfilled orders at the end of January for delivery within 30 days totaled 241,145 barrels, and 1,110,652 more for later delivery. Stocks at the end of the month were 54,353 barrels.

Members of the Steel Barrel Manufacturers Institute shipped 298,480 barrels in January and had on hand orders for 354,552 on Feb. 1. The business reported in January was \$927,752. Capacity was engaged to the extent of 45 per cent, being 21 per cent for I.C.C. barrels and 51 per cent for light barrels.

The American Welding Society will hold its annual meeting April 25, 26 and 27 at the Engineering Societies Building, New York. One technical session will be devoted to procedure standardization in welding, including qualifications of welders, inspection and supervision. Discussion of the subject will include procedure standardization relating to structural steel, pressure vessel and pipe welding.

The Lapham-Hickey Co., 518 Buhl Building, Detroit, and 1625 West Pershing Road, Chicago, has been appointed exclusive distributor in Illinois, Indiana, Michigan and Ohio for the Athenia Steel Co., Athenia, N. J., manufacturer of tempered and annealed clock spring steel. A complete stock will be carried at Chicago.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

Per Gross Ton

Rerolling, 4-in. and over.....	\$33.00
Rerolling, under 4-in. to and including 1½ in.	\$33.50 to 34.00
Forging, ordinary	38.00 to 39.00
Forging, guaranteed	43.00 to 44.00

Sheet Bars

Per Gross Ton

Open-hearth or Bessemer	\$34.00
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Slabs

Per Gross Ton

8 in. x 2 in. and larger.....	\$33.00
Smaller than 8 in. x 2 in.	34.00

Skelp

Per Lb.

Grooved	1.85c.
Sheared	1.85c.
Universal	1.85c.

Wire Rods

Per Gross Ton

Screw stock	\$5.00 per ton over base
Carbon 0.20% to 0.40%	5.00 per ton over base
Carbon 0.41% to 0.55%	5.00 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon over 0.75%	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is \$45. Cleveland mill base, \$44.

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton

Old range Bessemer, 51.50% iron.....	\$4.50
Old range non-Bessemer, 51.50% iron.....	4.40
Mesabi Bessemer, 51.50% iron.....	4.40
Mesabi non-Bessemer, 51.50% iron.....	4.25
High phosphorus, 51.50% iron.....	4.15

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Unit

Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria.....	10.00c.
Iron ore, Swedish, average 66% iron, 9.25c. to 9.50c.	
Manganese ore, washed, 52% manganese, from the Caucasus	39c.
Manganese ore, Brazilian, African or Indian, basis 50%38c. to 39c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$10.25 to \$10.75

Per Gross Ton

Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
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Per Lb.

Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.
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Coke

Per Net Ton

Furnace, f.o.b. Connellsville prompt	\$2.75
Foundry, f.o.b. Connellsville prompt	3.75 to 4.50
Foundry, by-products, Ch'go ovens	9.00
Foundry, by-product, New England, del'd	11.50
Foundry, by-product, Newark or Jersey City, delivered.....	9.45 to 9.85
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis.....	9.75

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.80
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in., f.o.b. Pa. mines	2.00 to 2.10
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.90
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.10
Gas slack, f.o.b. W. Pa. mines	1.10 to 1.20

Ferromanganese

Per Gross Ton

Domestic, 80%, furnace or seab'd.....	\$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$31.00 to \$32.00
Domestic, 16 to 19%	29.00

Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50 to \$88.50
75%	130.00 to 140.00
10%	\$35.00
11%	37.00
12%	44.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10%	\$30.00
11%	32.00
12%	34.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6%	\$23.00
7%	24.00
8%	25.00
9%	26.00
10%	\$28.00
11%	30.00
12%	32.00

Ferrotungsten, per lb. contained metal, del'd

Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads

Ferrovanadium, per lb. contained vanadium, f.o.b. furnace

Ferrocobaltitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads

Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per net ton

Ferrophosphorus, electric, 24%, f.o.b. Alton, Ill., per net ton

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Chicago

Steel Sales Continue at High Rate—Pig Iron Market Active

CHICAGO, Feb. 20.—Consumers of finished steel continue to enter this market at a lively rate and sales for the week are the third largest of any similar period so far this year. Although it may reasonably be assumed that specifications made earlier in the year were in some measure to balance stocks that had run low during the inventory period, it is now rather generally believed that current specifications closely represent consumptive demand. Deliveries are being extended.

The Union Pacific has ordered 500 flat and 25 passenger cars, all of which will be constructed in Central Western shops. Noteworthy among structural awards this week is 4000 tons for the Drake Tower, Chicago, taken by the American Bridge Co. It is probable that a Chicago shop will fabricate the 8000 tons required for a viaduct at Milwaukee.

Sales of billets have been heavy, not less than 20,000 tons having been taken by a producer with mills at Chicago and east of this district.

Evidence is at hand that prices for cast iron pipe are seeking higher levels. Fresh inquiry for that commodity is active.

Heavy melting steel has sold at 50c. a ton higher and other steel mill grades of scrap are correspondingly strong, but foundry specialties and blast furnace grades are weak.

Pig Iron.—Business continues active, particularly for second quarter delivery. Four merchant stacks are in blast but this output added to the foundry iron sold by local steel producers totals less than current shipments, affording a further reduction in stocks at Chicago furnaces. Prices for Northern iron are firm at \$18.50 and full differentials are being obtained. Quotations by furnaces to the south are steady and local producers are meeting with little difficulty in maintaining the full Chicago schedule in intermediate territory where freight differentials are in favor of the Northern furnaces. Reports that iron to come in by boat from Lake Erie furnaces is being offered are not quieted in spite of the fact that several options against water shipments at the opening of navigation have been cancelled.

Prices per gross ton at Chicago:

Northern No. 2 foundry, sil. 1.75 to 2.25	\$18.50
N'th'n No. 1 fdy, sil. 2.25 to 2.75	19.00
Malleable, not over 2.25 sil.	18.50
High phosphorus	18.50
Lake Superior charcoal, averaging sil. 1.50	27.04
Southern No. 2 fdy, (all rail)	22.01
Southern No. 2 (barge and rail)	20.18
Low phosph., sil. 1 to 2 per cent, copper free	\$28.50 to 29.00
Silvery, sil. 8 per cent	29.79
Bessemer ferrosilicon, 14 to 15 per cent	46.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Specifications for ferrosilicon are heavy and carload sales for immediate delivery are at \$83.50. Ferromanganese is quiet at \$100, seaboard. Spiegeleisen is being offered at \$38.76 to \$39.76, delivered.

Prices delivered Chicago: 80 per cent ferromanganese, \$107.56; 50 per cent ferrosilicon, \$83.50 to \$87.50; spiegeleisen, 19 to 21 per cent, \$38.76 to \$39.76.

Plates.—Two orders for tank plates for delivery in the Southwest total 4000 tons, about half of which will be rolled in Chicago district mills. This tonnage is for shipment at the earliest convenience of producers. The Chicago Bridge & Iron Works has taken 1000 tons for refinery work for the Standard Oil Co. at El Paso, Tex. The railroad equipment market is almost devoid of fresh inquiries. The Union Pacific has ordered 500 flat cars and bids have been submitted on the 2000 refrigerators to be purchased by the Pacific Fruit Express. It is understood here that about one-fourth of those cars may be built on the Pacific Coast. The Chicago & Eastern Illinois has taken new bids on

500 freight cars. The trade is looking daily for orders from the Burlington for 150 ballast cars. Shipping schedules are being arranged on 45,000 tons of steel required for 4000 cars recently ordered by the St. Louis-San Francisco. Demand for plates from the building industry is active but rolling schedules are easily arranged because of delay between awards to fabricators and the actual beginning of erection. Prices are firm at 1.95c., Chicago, for lots of 100 tons or more.

Mill prices on plates per lb.: 1.95c. to 2.05c., base, Chicago.

Structural Material.—New business in structural material is active but in smaller volume, following heavy lettings of the past three weeks. The Drake Tower, requiring 4000 tons, has been awarded. Local shops are well supplied with heavy tonnage orders but are finding schedules difficult to arrange because of the lack of small fill-in contracts. This condition keeps competition at high pitch and no improvement is noted in prices obtained by fabricators. The Great Lakes Dredge & Dock Co. has been awarded the general contract for the Robey Street viaduct, Chicago. Chicago producers are holding rigidly to 1.95c. for 100 tons or more in a single order and at 2.05c. for smaller lots.

Mill prices on plain material per lb.: 1.95c. to 2.05c., base, Chicago.

Bars.—Sales of mild steel bars for the week are ahead of shipments. Deliveries range four to six weeks, which brings local mill bookings close to the end of the first quarter. Producers say that sales made now are for delivery in the first three months only and that no tonnage will be carried into April. Announcement of second quarter prices may be near at hand. Quotations in Chicago are firm at 1.95c. for lots of 100 tons or more. The iron bar market is quiet both in inquiries and sales. Orders for alloy steel bars are keeping Chicago mills engaged at 85 per cent of capacity. Demand for rail steel bars continues to grow and specifications are heavier than shipments. Barn equipment manufacturers and bed makers are enjoying a better volume of business. Prices are steady at 1.80c., Chicago Heights mills.

Mill prices per lb.: Soft steel bars, 1.95c. to 2.05c., base, Chicago; common bar iron, 1.90c., base, Chicago; rail steel bars, 1.80c., base, Chicago Heights mill.

Cast Iron Pipe.—Taking fresh inquiry as a gage, the cast iron pipe market has shown a marked improvement in the week. New buying is sluggish and is confined to car lot purchases except for several orders, aggregating 2500 tons, from public utility operators. Bids opened at Detroit on 2000 tons of 24-in., class C pipe, disclose that French pipe was priced at \$27, Birmingham, while three American foundries, whose bids cover the full requirements of Detroit, were all within a few cents of \$30, Birmingham. It appears that delivery is an important factor in the placing of this business and therefore it is not unlikely that the tonnage will be distributed among the American Cast Iron Pipe Co., the National Cast Iron Pipe Co. and James B. Clow & Sons. Chicago will open bids Feb. 29 on 1600 tons of 8 and 12-in. class B pipe, and Akron, Ohio, will receive tenders up to Feb. 21 on 1500 tons of 4 to 16-in. pipe and 100 tons of fittings. Saginaw, Mich., will buy 475 tons of 6 to 24-in. pipe and 30 tons of fittings, and Grosse Point Farms, Mich., has need of 150 tons of 8 and 12-in. pipe. Bids at Detroit and prices quoted locally to contractors show that quotations on 6-in. and larger pipe are at \$29.50 to \$30.00, Birmingham, or \$37.70 to \$38.20, delivered Chicago.

Prices per net ton, delivered Chicago: Water pipe, 6-in. and over, \$37.70 to \$38.20; 4-in., \$41.70 to \$42.20; Class A and gas pipe, \$4 extra.

Wire Products.—The jobbing trade continues to find business brisk and orders to mills are about equal to output, which is a shade above 75 per cent of capacity. Some production departments are fully engaged while others are operating at about 50 per cent, indicating a less balanced condition than prevailed at the beginning of the month. Business in the Middle West and in the South is good, while some improvement is noted in the near Northwest. Specifications from the manufacturing trade are growing slowly. Demand

from warehouses is not keeping pace with that from other sources. Plain bright wire is steady at \$2.55 per 100 lb., Chicago. Sellers plan to announce second quarter prices on March 1. Prices of wire and wire products are given on page 557.

Rails and Track Supplies.—Chicago district rail mills are operating at capacity and with shipping schedules well arranged there is little complaint on deliveries. New buying is quiet. Several railroads have purchased a total of 6000 tons of track accessories and fresh inquiry has raised the pending list to 15,000 tons. Light rail orders are confined to miscellaneous carlots.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36. *Per Lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.25c.; angle bars, 2.75c.

Sheets.—Following the announcement that present prices will be quoted for second quarter, sales of sheets have grown heavier. First quarter requirements have been well covered. Specifications have expanded and deliveries have been pushed ahead to an average of three weeks. The call for shipments is widespread both as to consuming industries and territory served.

Base prices per lb., delivered from mill in Chicago: No. 24 black, 3.05c.; No. 24 galvanized, 3.90c.; No. 10 blue annealed, 2.25c. to 2.35c. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Reinforcing Bars.—Interest in this market centers chiefly around business which will come from recently announced office building construction. Fresh inquiry is not large. Sales consist largely of individual orders of less than 100 tons each. The downward trend in bending shop operations is checked at 40 per cent of capacity but order books are small and the outlook is not reassuring. Recent awards have not served to test billet steel reinforcing bar prices. The hard steel commodity is quotable 1.80c. to 1.95c., Chicago Heights mills.

Bolts, Nuts and Rivets.—Fresh buying of small rivets is sluggish at the new discounts and a test of the market has not been made. Bolt and nut users are taking larger quantities. Large rivets are steady at \$2.85 per 100 lb., f.o.b. Chicago.

Hot Rolled Strip.—Demand from automobile frame makers is heavy and March schedules of shipments to that industry indicate that the rate will be sustained. Producers here find that new uses for this commodity are rapidly coming to light and that the general demand is broadening. Prices in the Chicago market are unchanged, though quotations to the east of here are reported to have been advanced.

Coke.—Shipments are steady and prices for by-product foundry coke are unchanged at \$9, f.o.b. local ovens, and at \$9.50, delivered in the Chicago switching district.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforcing bars, billet steel.....	2.35c. to 2.75c.
Cold-finished steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands.....	3.65c.
Hoops.....	4.15c.
Black sheets (No. 24).....	3.95c.
Galvanized sheets (No. 24).....	4.80c.
Blue annealed sheets (No. 10).....	3.50c.
Spikes, standard railroad.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	3.60c.
Rivets, boiler.....	3.60c.
Per Cent Off List	
Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, squares, tapped or blank.....	60
Hot-pressed nuts, hexagons, tapped or blank.....	60
No. 8 black annealed wire, per 100 lb.....	\$3.20
Common wire nails, base per keg.....	3.00
Cement coated nails, base per keg.....	2.90

Old Material.—A Chicago mill has purchased close to 15,000 tons of heavy melting steel at \$13.50 a gross ton, delivered. This is 50c. a ton higher than prevailed on recent heavy sales. Dealers, pressed to cover on No. 1 heavy melting steel contracts, are offering \$13.25. Steel mill operation is placing a heavy drain on the local market especially for the better grades of melting steel. Specialties, mainly the cast grades, are weak and the price of cast iron borings is sagging under pressure of a more than adequate supply and the refusal of many large users to make purchases at prices asked. It is reported that one large buyer is holding out for a delivered price of \$10. Malleable foundries are not anxious to take deliveries against recent purchases and are not interested in current offerings. A number of gray iron foundries are declining to take deliveries pending the reduction of stocks on hand.

Prices delivered consumers' yards, Chicago:

Per Gross Ton

Basic Open-Hearth Grades:

Heavy melting steel.....	\$13.00 to \$13.50
Shoveling steel.....	13.00 to 13.50
Frogs, switches and guards, cut apart, and miscellaneous rails.....	14.25 to 14.75
Hydraulic compressed sheets.....	11.50 to 12.00
Drop forge flashings.....	9.75 to 10.25
Forged, cast and rolled steel car-wheels.....	15.25 to 15.75
Railroad tires, charging box size.....	16.50 to 17.00
Railroad leaf springs, cut apart.....	16.50 to 17.00

Acid Open-Hearth Grades:

Steel couplers and knuckles.....	14.50 to 15.00
Coil springs.....	16.50 to 17.00

Electric Furnace Grades:

Axle turnings.....	13.00 to 13.50
Low phosphorus punchings.....	14.25 to 14.75
Low phosphorus plate, 12 in. and under.....	13.50 to 14.00

Blast Furnace Grades:

Axle turnings.....	10.75 to 11.25
Cast iron borings.....	10.00 to 10.50
Short shoveling turnings.....	10.00 to 10.50
Machine shop turnings.....	7.50 to 8.00

Rolling Mill Grades:

Iron rails.....	13.50 to 14.00
Rerolling rails.....	15.00 to 15.50

Cupola Grades:

Steel rails less than 3 ft.....	15.25 to 15.75
Angle bars, steel.....	14.25 to 14.75
Cast iron carwheels.....	14.00 to 14.50

Malleable Grades:

Railroad.....	13.00 to 13.50
Agricultural.....	12.50 to 13.00

Miscellaneous:

*Relaying rails, 56 to 60 lb.....	23.00 to 25.00
*Relaying rails, 65 lb. and heavier.....	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:

Iron angle and splice bars.....	14.00 to 14.50
Iron arch bars and transoms.....	19.25 to 19.75
Iron car axles.....	21.50 to 22.00
Steel car axles.....	16.50 to 17.00
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	11.50 to 12.00
No. 1 busheling.....	9.75 to 10.25
No. 2 busheling.....	4.25 to 4.75
Locomotive tires, smooth.....	12.50 to 13.00
Pipes and flues.....	8.00 to 8.50

Cupola Grades:

No. 1 machinery cast.....	14.50 to 15.00
No. 1 railroad cast.....	13.00 to 13.50
No. 1 agricultural cast.....	13.00 to 13.50
Stove plate.....	11.25 to 11.75
Grate bars.....	11.50 to 12.00
Brake shoes.....	11.50 to 12.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

The Lally Co., Union Trust Building, Pittsburgh, dealer in tubular steel products, has been succeeded by Lally-McKelvy, Inc., which retains the present offices and will maintain its predecessor's connections and represent the Delaware Seamless Tube Co., Auburn, Pa., on sales in western Pennsylvania, western New York and West Virginia.

Changes in business methods necessary to meet new conditions will be the theme of the second annual conference of the Society for the Interchange of Merchandising Ideas which will be held at Nela Park, Cleveland, Feb. 27 and 28. F. J. Nichols, president of the F. J. Nichols Co., Dayton, Ohio, marketing counselor, is adviser to the executive committee of the society, members of which include Bennett Chapple, publicity director, American Rolling Mill Co., Middletown, Ohio.

New York

Pig Iron Sales 10,000 Tons—Three Buildings Will Take 50,000 Tons of Steel

NEW YORK, Feb. 20.—Pig iron buying is at a sustained rate, sales at 10,000 tons being on a par with the total of last week, and inquiry is heavier. Fully 15,000 tons is under negotiation, and it is regarded as significant that several melters who recently bought good-sized tonnages are in the market for additional iron. The largest new inquiry is from the National Radiator Corporation, Johnstown, Pa., and calls for 5000 tons. Abendroth Brothers, Port Chester, N. Y., are in the market for 1000 tons each of No. 2 plain and No. 2X for April and May delivery, and the General Fire Extinguisher Co., Providence, R. I., is inquiring for 1800 tons. Another New England buyer is negotiating for 1500 tons. The only inquiry calling for deliveries beyond the second quarter is from the A. P. Smith Mfg. Co., East Orange, N. J., calling for 600 tons of No. 2 plain and No. 2X for shipment from April through July. Prices show little change except that recent concessions on sizable tonnages have had the effect of making \$16.50, base Buffalo, a more open quotation on attractive business. On smaller lots, however, \$17 is still being obtained. The recent advance to \$20, base furnace, on eastern Pennsylvania foundry iron is still largely untested in this territory.

Prices per gross ton, delivered New York district:		
Buffalo No. 2 fdy., sil.	1.75 to	
2.25		\$21.41 to \$21.91
East, Pa. No. 2 fdy., sil.	1.75 to	
2.25		20.39 to 22.52
East, Pa. No. 2 fdy., sil.	2.25 to	
2.75		20.89 to 23.02
East, Pa. No. 1X fdy., sil.	2.75 to	
3.25		21.39 to 23.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

Finished Steel.—Specifications on old contracts are coming in at about the same rate as during the last two weeks, but buyers are so well covered on needs for the present quarter that it will probably be three or four weeks before recently established prices on a number of finished products may be adequately tested. Reflecting the activity of the building industry in this territory, the outlook for shapes seems unusually bright. Three large buildings in New York for which plans are being prepared will probably require a total of 50,000 tons, and engineers and architects are rushing plans for further work in view of an advancing market. On new business shape mills seem to be adhering to 2.14½c., New York. A feature of the market is the reported placing of 2000 box car bodies with a Baltimore car builder by the Baltimore & Ohio. Activity in bars is not pronounced, but specifications are coming in at a fair rate. A large independent oil company is inquiring for 100,000 boxes of tin plate and a Japanese oil company for 60,000 boxes. There is also a growing interest in steel pipe for oil company use, and several municipalities and private corporations are inquiring for fair-sized tonnages of casing and line pipe. Sheet prices have been somewhat weaker in the last few days, and one or two companies apparently have not yet advanced their prices to the recently announced levels. However, small sales are being made at 2.90c., Pittsburgh, for black, 3.75c. for galvanized and 2.10c. and 2.20c. for blue annealed, according to width. There has been some opportunity to test the 2.50c. price for wire, but most consumers are well covered for the quarter. This condition is more pronounced in nails and buying at 2.65c., the new price, is almost entirely lacking.

Mill prices per lb., delivered New York: Soft steel bars, 2.19c.; plates, 2.17½c.; structural shapes, 2.14½c.; bar iron, 2.14c.

Warehouse Business.—Purchasing from stock has been rather light in the past week, but there is very little tendency to shade the present schedule of prices. The market on black and galvanized sheets in New York and in local New Jersey still shows a considerable difference with black sheets at 4c. per lb., base, in New York and 4.20c. per lb. in New Jersey and

galvanized at 4.70c. in New York and 4.95c. per lb. in New Jersey.

Cast Iron Pipe.—A large Southern maker has advanced the base price on pipe to \$29.50 per ton, Birmingham, the increase to apply on all small routine inquiries. This move, however, is not generally reflected in the market, as competition is still keen enough to bring out prices below \$28, Birmingham, on comparatively small jobs. Newark, N. J., has placed 1000 tons of 6 to 16-in. cast pipe with the United States Cast Iron Pipe & Foundry Co. and this maker has also closed on 800 tons of 48-in. pipe for New Bedford, Mass. The New Haven Water Co., New Haven, Conn., has placed 2000 tons, presumably with the same foundry.

Prices per net ton, delivered New York: Water pipe 6-in. and larger, \$37.25 to \$38.25; 4-in. and 5-in., \$42.25 to \$43.25; 3-in., \$52.25 to \$53.25; Class A and gas pipe, \$4 to \$5 extra.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.34c.
Soft steel bars and small shapes.....	3.24c.
Iron bars.....	3.24c.
Iron bars, Swedish charcoal.....	7.00c. to 7.25c.
Cold-finished shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-rolled strip, soft and quarter hard,	5.15c. to 5.40c.
Hoops.....	4.49c.
Bands.....	3.99c.
Blue annealed sheets (No. 10 gage),	
Long terne sheets (No. 24).....	3.84c. to 3.89c.
Standard tool steel.....	5.80c.
Wire, black annealed.....	12.00c.
Wire, galvanized annealed.....	4.50c.
Tire steel, 1½ x ½ in. and larger.....	5.15c.
Smooth finish, 1 to 2½ x ¼ in. and	3.30c.
larger.....	3.65c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.
Machine bolts, cut thread: Per Cent Off List	
¾ x 6 in. and smaller.....	55 to 60
1 x 30 in. and smaller.....	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller.....	55 to 60
¾ x 20 in. and smaller.....	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller.....	55 to 60
1 x 16 in. and smaller.....	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded steel, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12

Wrought Iron—

½-in. butt	5	+19
¾-in. butt	11	+9
1-1½-in. butt	14	+6
2-in. lap	5	+14
3-6-in. lap	11	+6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box.....	\$6.45	\$6.20
Charcoal, per box—	A	AAA
IC	\$9.70	\$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20.....	3.80c. to 4.00c.
No. 22	3.95c. to 4.15c.
No. 24	4.00c. to 4.20c.
No. 26	4.10c. to 4.30c.
No. 28*	4.25c. to 4.45c.
No. 30	4.50c. to 4.70c.

Sheets, Galvanized

	Per Lb.
No. 14	4.35c.
No. 16	4.45c.
No. 18	4.35c. to 4.60c.
No. 20	4.50c. to 4.75c.
No. 22	4.55c. to 4.80c.
No. 24	4.70c. to 4.95c.
No. 26	4.95c. to 5.20c.
No. 28*	5.20c. to 5.45c.
No. 30	5.60c. to 5.85c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Reinforcing Bars.—Inquiry has come out for two large industrial buildings in Manhattan, one of which will require 1000 tons of bars and the other 500 tons. Otherwise the market is without feature, awards having been mostly small tonnages. The mill price is unchanged at 1.95c. per lb., Pittsburgh. Distributors are quoting 2.20c., Youngstown warehouse, or 2.57½c., on cars at New York, and out of New York warehouse the general quotation is 2.80c. for lots of 5 tons or more, 2.95c. for lots of 2 to 5 tons and 3.24c. for less than 2 tons, all delivered at job.

Coke.—Furnace coke is somewhat easier, but specifications for the foundry grade are coming in at a satisfactory rate. There is very little spot demand. Standard foundry is quoted for prompt shipment at \$4 to \$4.50 per ton, Connellsville, and standard furnace at from \$2.75 to \$3 per ton, Connellsville. Delivered prices are: To northern New Jersey, \$8.03 to \$8.53; to New York or Brooklyn, \$8.79 to \$9.29; to Newark or Jersey City, \$7.91 to \$8.41. By-product coke continues at \$9 to \$9.40 per net ton, delivered Newark or Jersey City.

Old Material.—Except for some sizable purchases of No. 1 heavy melting steel by eastern Pennsylvania consumers, the scrap market has continued rather inactive. A Coatesville, Pa., mill recently closed on about 18,000 tons and a Bethlehem, Pa., consumer purchased a sizable tonnage of No. 1 steel. Yard grade of heavy melting steel is quiet but a fair tonnage is moving to Harrisburg and Pottsville, Pa., mills, for which brokers are paying \$11 per ton, delivered. On yard steel shipments to Phoenixville, Pa., only \$10.75 per ton, delivered, is being offered by most dealers. Efforts of a Phoenixville consumer of stove plate and machine shop turnings to purchase stove plate at \$12.50 and turnings at less than \$11 have apparently been unsuccessful thus far, as brokers claim that it is necessary to pay these prices to obtain sufficient tonnage.

No. 1 heavy melting steel.....	\$10.00 to \$10.85
Heavy melting steel (yard).....	7.00 to 7.25
No. 1 heavy breakable cast.....	11.25 to 12.00
Stove plate (steel works).....	8.75 to 9.00
Locomotive grate bars	8.75 to 9.00
Machine shop turnings	6.75 to 7.50
Short shoveling turnings.....	7.00 to 7.50
Cast borings (blast furnace or steel works)	6.75 to 7.50
Mixed borings and turnings.....	7.00 to 7.50
Steel car axles	16.00 to 16.50
Iron car axles	23.75 to 24.75
Iron and steel pipe (1 in. diam., not under 2 ft. long)	8.75
Forge fire.....	6.75 to 7.00
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought, long.....	9.00 to 9.50
Rails for rolling.....	10.50 to 11.00
Cast iron carwheels.....	11.25 to 11.75
Stove plate (foundry).....	8.50 to 9.00
Malleable cast (railroad).....	10.00 to 10.50
Cast borings (chemical).....	11.00 to 11.50
<i>Prices per gross ton, delivered local foundries:</i>	
No. 1 machinery cast	\$13.75 to \$14.25
No. 1 heavy cast (columns, build- ing materials, etc.), cupola size	11.75 to 12.25
No. 2 cast (radiators, cast boil- ers, etc.)	11.25 to 11.75

Of 53 independent open-hearth furnaces in the Mahoning Valley, 41 are melting this week, against 39 the preceding week, while 108 of 127 sheet mills are under power. Some rolling mill companies, such as the Newton Steel Co. and the Trumbull Steel Co. are operating Sundays to meet demands on certain departments.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars	3.00c.
Reinforcing steel bars	2.25c. to 2.75c.
Cold-finished rounds and hexagons.....	3.65c.
Cold-finished flats and squares.....	4.15c.
Hoops and bands	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.75c.
Galvanized sheets (No. 24)	4.40c. to 4.60c.
Blue annealed sheets (No. 10)	3.25c.
No. 9 annealed wire, per 100 lb.....	\$2.90
No. 9 galvanized wire, per 100 lb.....	3.35
Common wire nails, base per keg	2.90

*Net base, including boxing and cutting to length.

Cleveland

Demand for Steel Keeping Up—Pig Iron Sales of 53,000 Tons

CLEVELAND, Feb. 20.—Orders for finished steel against contracts are keeping up to the recent good volume, but it is not expected that February business will be quite equal to that in January. While some small-lot business in steel bars, plates and structural material is being taken at present prices, most orders are against lower-priced contracts that extend through the quarter. On new business, 1.85c., Pittsburgh, is being maintained on steel bars, plates and structural material and mills in some cases are able to get 1.95c. for small miscellaneous lots of steel bars. Local mills quote steel bars at 1.85c., Cleveland.

With increased mill operations, the steel output is about on a parity with orders, so that with a few exceptions, mills are not accumulating backlogs. On the other hand, consumers do not appear to be ordering in excess of current needs and are not accumulating stock, this being indicated by requests for prompt shipments. Specifications from the automotive industry continue heavy, but this industry, as well as other consumers, is covered for the present quarter. Some of the automobile manufacturers will increase slightly their output in March. Motor car manufacturers have taken heavy orders from dealers, but it will be some time before the extent of purchases by car users this spring will be known. However, a large amount of business in low-priced cars was held back late last year as buyers were waiting for the appearance of the Ford model and it seems certain that this year's sales of cars of this class will be heavy.

Consumers of steel bars, plates, and structural material are beginning to show an interest in second quarter contracts. The belief is rather general that present prices will prevail for that delivery and that if there is another advance it will not be made until buyers have an opportunity to cover at present quotations. The opening of books for second quarter contracts for sheets and hot and cold-rolled strip steel has not yet brought out any business for that delivery.

The American Steel & Wire Co. will blow in an additional blast furnace in Cleveland about March 1. It is now operating two of its four stacks.

Strip Steel.—Specifications are liberal against contracts for hot and cold-rolled strip taken at lower prices than those now prevailing, but there is very little new business, as most consumers are covered for the quarter. While mills have opened their books for the second quarter at the recently revised prices on hot strip and the current prices on cold strip, no buying has as yet developed for that delivery.

Iron Ore.—The consumption of Lake Superior ore during January amounted to 4,303,132 tons, an increase of 311,033 tons over December. During January last year 4,523,863 tons was consumed. Furnace stocks Feb. 1 amounted to 27,061,994 tons. Ore on hand at furnaces and Lake Erie docks Feb. 1 totaled 33,349,994 tons, as compared with 33,971,030 tons on the same date a year ago. Central district furnaces consumed 2,063,871 tons of ore in January, an increase of 157,530 tons over the previous month. Lake front furnaces consumed 2,060,464 tons, a gain of 177,917 tons; Eastern furnaces used 44,442 tons, a decrease of 19,978 tons, and all rail furnaces consumed 134,355 tons, a decrease of 4436 tons. On Jan. 31 there were 156 furnaces in blast using Lake ore, a gain of 12 for the month.

Pig Iron.—Sales showed a sharp gain the past week, during which Cleveland interests sold 53,000 tons of foundry and malleable iron for delivery through the second quarter. The increase is due in part to the booking of considerable iron in the East to be shipped from Buffalo furnaces. Considerable business was also taken in the Michigan territory. Sales in Ohio were moderate. One producer has advanced its Lake furnace price 50c. a ton to \$17.50 for foundry and malleable iron, but others are still quoting \$17, which is the ruling price in the Cleveland territory. However, efforts to establish the Lake furnace market at \$17 have not been wholly successful as \$16.50 has not dis-

appeared as a price for shipment to competitive points. Full silicon differentials are not always being maintained. In Michigan \$18 is the ruling price, the market there holding to the recent 50c. advance. Shipping orders continue heavy from the automotive industry and are fair from other sources. However, shipping orders indicate that many consumers overbought late last year and will carry considerable first quarter iron over into the second quarter. Business has improved with radiator manufacturers and some plants in this industry will increase operations.

Prices per gross ton at Cleveland:

N'th'n No. 2 fdy., sil. 1.75 to 2.25.....	\$18.50
Southern fdy., sil. 1.75 to 2.25.....	22.00
Malleable.....	18.50
Ohio silvery, 8 per cent.....	28.00
Basic, Valley furnace.....	17.00
Standard low phos., Valley furnace.....	\$26.50 to 27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Reinforcing Bars.—Some shading is reported on round-lot business and warehouse prices are irregular. Rail steel bars are unchanged at 1.75c., mill, but cannot compete in Cleveland at this price with billet steel bars.

Warehouse Business.—Jobbers' sales show a gain and the volume of business is quite satisfactory. The adoption of lump sum extras by mills on hot-rolled steel bars has diverted some business from mills to warehouses. Hardware jobbers have not followed the recent advance on galvanized sheets.

Sheets.—Consumers are showing no interest in second quarter contracts, although mills have opened their books for that delivery. Specifications continue good from the automotive industry and are fair from other consumers, but there is very little current buying. Regular quotations are being well maintained on black and blue annealed sheets, but galvanized sheets, for which the demand is not very brisk, are irregular with concessions reported of as much as \$4 a ton from 3.75c., Pittsburgh base. Jobbers placed contracts a few weeks ago at prices that enable them to sell at a profit at lower than present mill prices and they are responsible for some of the present price shading.

Coke.—New demand for foundry coke is limited to car lots. Prices are unchanged at \$8, Painesville, for by-product foundry coke, or \$9.01, delivered Cleveland; \$3.75 to \$5.10, ovens, for Connellsville foundry coke and \$2.75 for heating coke.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is slow, although it shows a little gain. Rivets continue dull. Practically all orders are specifications against contracts.

Old Material.—Mills are still holding down shipments to very limited quantities and the market is inactive. There is no buying by the mills, and dealers and producers are making little effort to make sales, as there is not much incentive to dispose of material they cannot ship. Dealers having old orders are cov-

ered and out of the market. Blast furnace scrap is being rather freely offered at \$10.25, a reduction of 25 cents a ton. Other grades are unchanged.

Prices per gross ton, delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$13.75 to \$14.00
No. 2 heavy melting steel.....	13.25 to 13.50
Compressed sheet steel.....	12.75 to 13.00
Light bundled sheet stampings.....	11.50 to 11.75
Drop forge flashings.....	12.50 to 13.00
Machine shop turnings.....	9.00 to 9.25
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	13.50 to 14.00
No. 1 busheling.....	11.00 to 11.25
Pipes and flues.....	9.00 to 9.50
Steel axle turnings.....	12.50 to 13.00

Acid Open-Hearth Grades	
Low phosphorus forging crops.....	16.50 to 17.00
Low phosphorus, billet, bloom and slab crops.....	17.00 to 17.50
Low phosphorus sheet bar crops.....	16.50 to 17.00
Low phosphorus plate scrap.....	16.00 to 16.50

Blast Furnace Grades	
Cast iron borings.....	10.25 to 10.50
Mixed borings and short turnings.....	10.25 to 10.50
No. 2 busheling.....	10.25 to 10.50
Cupola Grades	
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	11.00 to 12.00
Stove plate.....	12.00 to 12.50
Rails under 3 ft.....	18.00 to 18.50
Miscellaneous	
Railroad malleable.....	15.00 to 15.50
Rails for rolling.....	16.25 to 16.50

Philadelphia

Further Advance Expected on Plates, Shapes and Bars

PHILADELPHIA, Feb. 20.—Consumers of steel apparently specified sufficient tonnage during January and early February to cover nearby requirements. Consequently, shipments against first quarter contracts have been lighter and new business is extremely limited. It is expected that there will be a further price advance on plates, shapes and bars for second quarter delivery, but consumers will in all probability be given an opportunity to cover at the present level.

Pig Iron.—The market is decidedly inactive and purchasing is confined almost exclusively to occasional carload lots by the larger foundry consumers, who apparently underestimated their requirements when contracting for the present quarter. On the other hand, the smaller jobbing foundries are evidently well supplied with iron and in some instances are inclined to ask for delays in shipments on their contracts. It is estimated that current inquiry in this district is not much more than 1000 tons of foundry iron. Furnaces are maintaining the new price of \$20, base, on foundry grades, despite the small volume of present business. Of the three principal basic buyers in eastern Pennsylvania, one has recently bought a tonnage, another is reported to be supplied for the next month to six weeks, and the third is still receiving shipments on an old contract. Business in low phosphorus iron is confined to occasional carload lots.

Prices per gross ton at Philadelphia:

East. Pa. No. 2 plain, 1.75 to 2.25	\$20.76
sil.	21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76
Basic (delivered eastern Pa.)	\$19.50 to 20.00
Gray forge	19.75 to 20.25
Malleable	21.00 to 21.50
Standard low phos. (f.o.b. New York State furnace)	23.00 to 24.00
Copper bearing low phos. (f.o.b. furnace)	23.50 to 24.00
Virginia No. 2 plain, 1.75 to 2.25	24.54 to 25.04
sil.	25.04 to 25.54
Virginia No. 2X, 2.25 to 2.75 sil.	25.04 to 25.54

Prices, except as specified otherwise, are delivered Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Billets.—Business is restricted to small lots for prompt shipment, and prices are unchanged at \$33 per ton, Pittsburgh, for rerolling billets and at \$38 per ton for forging grade. The plate market being quiet, an eastern Pennsylvania plate mill is seeking business in forging billets.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.50c. to 2.60c.
Plates, $\frac{3}{4}$ -in.	2.80c. to 3.00c.
Structural shapes.....	2.40c. to 2.60c.
Soft steel bars, small shapes and iron bars (except bands).....	2.40c.
Round-edge iron.....	3.50c.
Round-edge steel, iron finished, $1\frac{1}{2} \times 1\frac{1}{2}$ in.....	3.50c.
Round-edge steel, planished.....	4.30c.
Reinforcing steel bars, square, twisted and deformed.....	2.50c. to 3.00c.
Cold-finished steel, rounds and hexagons.....	3.35c.
Cold-finished steel, squares and flats.....	3.85c.
Steel hoops.....	3.50c.
Steel bands, No. 12 gage to $\frac{1}{2}$ -in., inclusive.....	3.25c.
Spring steel.....	5.00c.
Black sheets (No. 24).....	4.25c.
Galvanized sheets (No. 24).....	5.10c.
Blue annealed sheets (No. 10).....	3.15c.
Diamond pattern floor plates—	
$\frac{1}{4}$ -in.	5.30c.
$\frac{3}{4}$ -in.	5.50c.
Rails.....	3.20c.
Swedish iron bars.....	6.60c.

Bars.—Current specifications against contracts are small and there is very little purchasing at the present level of quotations. Sellers seem confident that prices for second quarter will be advanced. The price for prompt shipment is 1.85c. per lb., Pittsburgh.

Shapes.—Fabricated steel projects are not numerous and most of the present business involves small tonnages. Competition among fabricators is keen. While the market on shapes has advanced twice in a comparatively short period, bids on structural projects are still at about the same level as before the advances. Shapes are quoted at 2c. per lb., Bethlehem, 1.975c. per lb., Pottsville, or 2.12c. to 2.13c. per lb., delivered Philadelphia.

Plates.—New business is slow in developing and specifications against contracts are light. Recent locomotive purchases by the railroads, however, are expected to provide some plate business. Prices continue at 2c. per lb., Coatesville, Pa., or 2.10c. per lb., delivered Philadelphia.

Sheets.—Although shading of prices on both black and galvanized sheets is still frequent, concessions are becoming smaller and the tendency of the market is apparently toward greater strength. Black sheets range from 2.75c. to 2.90c. per lb., base Pittsburgh, and galvanized from 3.65c. to 3.75c. per lb., base Pittsburgh. A firmer attitude is evident in blue annealed and strip steel sheets, which show little or no deviation from the basis of 2.10c. per lb., Pittsburgh.

Warehouse Business.—The recently applied quantity differentials on bars and small shapes are being maintained on most business in this district and the territory in which the differentials are quoted has been extended beyond the immediate Philadelphia district. Some jobbers expect that February will prove to be a better month than January.

Imports.—In the week ended Feb. 18, ore imports totaled 3736 gross tons, of which 3180 tons was Cuban chrome ore, 551 tons Portuguese African chrome ore and 5 tons South African manganese ore. Pig iron imports totaled 300 tons of Indian iron. Arrivals of steel consisted of 107 tons of bars from Belgium and 97 tons from France, 164 tons of shapes from Belgium, 44 tons of hoops from Belgium and 9 tons of strip steel from Great Britain. There was also 43 tons of steel scrap from Germany and 11 tons from Great Britain.

Old Material.—Except for some recent purchasing by a large eastern Pennsylvania consumer for several plants, the market is inactive. The total of these purchases was about 60,000 tons of No. 1 heavy melting steel, of which about 25,000 tons was for Sparrows Point, Md., and the remainder for Bethlehem, Steelton and Coatesville, Pa. Prices ranged from \$13.50 to \$14 per ton, delivered. The same consumer has purchased about 5000 tons of blast furnace scrap at \$10.50 per ton, delivered Bethlehem, Pa., and \$11 per ton, delivered Sparrows Point, Md.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.....	\$13.50 to \$14.00
Scrap T rails	13.00 to 13.50
No. 2 heavy melting steel.....	11.00 to 11.50
No. 1 railroad wrought.....	15.00 to 15.50
Bundled sheets (for steel works).....	10.50 to 11.00
Machine shop turnings (for steel works).....	11.00
Heavy axle turnings (or equivalent).....	12.00 to 12.50
Cast boring (for steel works and rolling mill).....	11.00
Heavy breakable cast (for steel works).....	15.50 to 16.00
Railroad grate bars	13.00
Stove plate (for steel works).....	13.00
No. 1 low phos., heavy, 0.04 per cent and under.....	18.00 to 18.50
Couplers and knuckles.....	16.00 to 16.50
Rolled steel wheels	15.50 to 16.00
No. 1 blast furnace scrap.....	10.00 to 10.50
Machine shop turnings (for rolling mill).....	11.00
Wrought iron and soft steel pipes and tubes (new specifications).....	12.50 to 13.00
Shafting	17.50 to 18.00
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00 to 12.00
Steel rails for rolling.....	15.00 to 15.50
Cast iron carwheels	15.50 to 16.50
No. 1 cast	16.00 to 16.50
Cast borings (for chemical plant).....	14.50 to 15.00

MORE STEEL IN RIVER CRAFT

Last Year 506 Hulls Were Launched, Taking 79,200 Tons of Steel—63,776 Tons in Preceding Year

USE of steel in inland waterway barges, boats and other river craft, as measured by the launchings of 1927, registered a substantial increase as compared with 1926. Last year 506 hulls were launched, in the construction of which 79,215 tons of steel was used. This compares with 366 hulls, taking 63,776 tons of steel in 1926 and with 269 hulls, taking 53,710 tons of steel, in 1925.

The steady rise in construction of steel river craft not only reflects the replacement of wood barges and boats by those of steel, but also the increasing use of the inland rivers for the movement of freight. In another year, the canalization of the Ohio River from its source to its junction with the Mississippi at Cairo, Ill., will be completed and this development is expected to be followed by a considerable swelling of the water-borne movement of the products of the Pittsburgh, Wheeling and Cincinnati districts.

Inland points, such as Youngstown, are seeking the assistance that even partial use of the rivers will afford steel manufacturers through lower freight charges. A movement now is under way to get the railroads to grant a proportional rate to some point on the Ohio River, where the Youngstown products can be transferred to river barges and carried to destinations. This is not possible under present conditions, which on any such movement would mean that the railroads would exact the local tariff to the point of river transfer.

The record of 1927 launchings is as follows:

Builder	Location	Number of Hulls	Number of Steel
American Bridge Co.....	Ambridge, Pa.....	132	19,662
Dravo Contracting Co.....	Pittsburgh	113	22,600
Riter-Conley Co.....	Leetsdale, Pa.....	60	9,000
Midland Barge Co.....	Midland, Pa.....	42	7,650
Marietta Mfg. Co.....	Point Pleasant, W. Va.....	49	5,310
Jones & Laughlin Steel Corporation	Pittsburgh	29	4,956
Nashville Bridge Co.....	Nashville, Tenn.....	25	3,650
Howard Shipyards & Dock Co.....	Jeffersonville, Ind.....	37	3,580
Charles Ward Engineering Works	Charleston, W. Va.....	12	1,835
Alabama Drydock & Shipbuilding Co.....	Mobile, Ala.....	7	1,014
Total 1927 launchings.....		506	79,257
Total 1926 launchings.....		366	63,776
Total 1925 launchings.....		269	53,710

American Rolling Mill Co. to Redeem 6 Per Cent Gold Notes

The American Rolling Mill Co. has informed holders of its 15-year sinking fund 6 per cent gold notes, due Jan. 1, 1938, that it will redeem on July 1 next the entire outstanding issue at 104½ and accrued interest. Pursuant to this notice, the company has authorized the Guaranty Trust Co. of New York to purchase any of these notes at the redemption price, with accrued interest to July 1, discounted on a 4½ per cent true discount basis figured to the redemption date. The calling of these notes is a part of the purpose of the refinancing plan approved by the company on Dec. 31, when the right to subscribe to one additional share of common stock for each six shares held was given to each stockholder and a \$25,000,000 issue of 5 per cent sinking fund gold debentures, callable as a whole or in part at 104 and interest, was marketed.

Orders for 1025 steel boilers in January, with 851,811 sq. ft. of heating surface, were reported to the Department of Commerce by 72 manufacturers. This compares with 1054 boilers and 905,680 sq. ft. in December. Of the January orders 1010 were stationary boilers, with 833,314 sq. ft., and 15 were marine boilers, with 18,497 sq. ft.

Boston

Sizable Tonnage of Basic Iron Sold in New England

BOSTON, Feb. 20.—It is understood a sizable tonnage has been placed by the two largest basic pig iron users in New England, with a larger portion presumably going to a Bridgeport, Conn., consumer. Details are lacking, but it is understood the tonnage runs well into five figures. A slump in foundry iron buying in the past week is reported. Sales did not exceed 3000 tons, of which Buffalo furnaces and furnaces east of Buffalo took practically all. Buffalo iron, silicon 1.75 to 2.25 per cent, is still offered at \$16.50 a ton, furnace, but on higher grades full differentials are generally maintained not only by Buffalo furnaces but by those east of Buffalo. Current iron sales are for deliveries straddling first and second quarters or for second quarter only. There are but two sizable inquiries in the market, one for 1000 tons of No. 2 plain and 1000 tons of No. 2X, and the other for 1000 tons of No. 2X and No. 1X.

Prices of foundry iron per gross ton, delivered to most New England points:

Buffalo, sil. 1.75 to 2.25	\$21.41 to \$21.91
Buffalo, sil. 2.25 to 2.75	21.41 to 22.41
East. Penn., sil. 1.75 to 2.25	23.15 to 23.65
East. Penn., sil. 2.25 to 2.75	23.65 to 24.15
Virginia, sil. 1.75 to 2.25	25.71
Virginia, sil. 2.25 to 2.75	26.21
Alabama, sil. 1.75 to 2.25	22.91 to 24.77
Alabama, sil. 2.25 to 2.75	23.41 to 25.27

Freight rates: \$4.91 from Buffalo, \$3.65 from eastern Pennsylvania, \$3.21 all rail from Virginia, \$6.91 to \$8.77 from Alabama.

Steel Grit.—New England foundries took quite a little steel grit the past week on a basis of \$120 a ton for small lots and \$100 a ton for large lots.

Bars.—Consumers' takings of steel bars are holding up well, but the average individual specification as well as current new order is small. Reinforcing bar business has fallen rather flat, daily average individual orders being less than 10 tons, with no easing in prices, however. Steel bars are 1.85c. to 1.90c. per lb., base Pittsburgh, generally 1.90c. Reinforcing bars from stock are 2.70c. to 2.75c., base, mostly 2.70c., with mill shipments 1.90c. per lb., base Pittsburgh, or 2.26½c. delivered in New England.

Cold-Rolled Strip.—Mill bookings of cold-rolled strip steel orders in the past week fell off somewhat. Most producers are well sold up into next month. Competition among Atlantic seaboard mills is keen. The Worcester, Mass., mill is holding to 3.30c. per lb., base, on lots of 1 to 3 tons and at 3.05c. on larger lots.

Shapes and Plates.—So far this month there has been a marked falling off in prospective fabricating jobs. At the moment, 123 tons of steel for a Weymouth,

Mass., town office building is the largest job up for figures. Even small jobs are lacking. Recent lettings of bridge work in Vermont disclosed keen competition among fabricators for the work, the low bidder being \$12 under the second lowest. Plate business is fairly good, but much less than it was a month ago. Standard shapes and plates are firm at 1.85c. per lb., base Pittsburgh.

Coke.—Demand for by-product foundry coke is still spotty owing to the low melt of iron. The price remains at \$11.50 a ton, delivered within a \$3.10 freight rate zone, and there is no indication of a change on March 1. Average weekly shipments by by-product ovens so far this year are a shade better than last year.

Old Material.—Brokers report it is easier to sell scrap, but more difficult to buy it because of the low prices offered by consumers. Purchases against an order for 3500 tons of steel scrap for shipment to Poland is helping the local market. There is practically no market for yard wrought and shippers are mixing it with steel. The market for steel axles is nominal. Long bundled skeleton sells mostly at \$6 a ton on cars, and short bundled skeleton at \$6.50. The general price on steel mill borings is \$6 a ton for blast furnace use. A Norwood, Mass., foundry is buying stove plate at \$10.50 a ton, delivered, and the Mystic Iron Works has also taken some on that basis. For shipment to Pennsylvania points, \$8 a ton on cars is the general price. New England foundries are buying textile and No. 1 machinery cast a little more freely, but show no interest in No. 2 machinery cast. Some No. 2 is going to Pennsylvania steel mills at \$10.50 to \$11 a ton, on cars shipping point.

Buying prices per gross ton f.o.b. Boston rate shipping point:

No. 1 heavy melting steel	\$9.00 to	\$9.10
Scrap T rails	8.75 to	9.00
Scrap girder rails	7.50 to	8.00
No. 1 railroad wrought	10.00 to	10.50
No. 1 yard wrought	8.50 to	9.00
Machine shop turnings	6.00 to	6.25
Cast iron borings (steel works and rolling mill)	6.00 to	6.25
Bundled skeleton, long	6.00 to	6.50
Forge flashings	6.50 to	7.00
Blast furnace borings and turnings	6.00 to	6.25
Forge scrap	6.00 to	6.50
Shafting	13.00 to	13.50
Steel car axles	15.50 to	16.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	8.00 to	8.50
Rails for rolling	10.00 to	10.50
Cast iron borings, chemical	10.00 to	10.50

Prices per gross ton delivered consumers' yards:

Textile cast	\$14.00 to	\$14.50
No. 1 machinery cast	14.50 to	15.00
No. 2 machinery cast	12.50 to	13.00
Stove plate	10.50 to	11.00
Railroad malleable	13.50 to	14.00

St. Louis

Pig Iron Sales 11,000 Tons—Steel Mill Operations at a High Rate

ST. LOUIS, Feb. 20.—With sales of 11,000 tons, the Granite City maker of pig iron enjoyed its best week of the year. Several thousand tons went to radiator manufacturers in the district, a wheel maker took 1000

Warehouse Prices, f.o.b. Boston	
	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars and small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.94c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.01c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons	*3.45c. to 5.45c.
Squares and flats	*3.95c. to 6.95c.
Toe cak steel	6.00c.
Rivets, structural or boiler	4.50c.
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-finished rounds, shafting and screw stock	3.75c.
Black sheets (No. 24)	4.45c.
Galvanized sheets (No. 24)	5.25c.
Blue annealed sheets (No. 10)	3.60c.
Black corrugated sheets (No. 24)	4.50c.
Galvanized corrugated sheets	5.30c.
Structural rivets	3.75c.
Boiler rivets	3.75c.
Per Cent Off List	
Tank rivets, 3/8-in. and smaller, 100 lb. or more	70
Less than 100 lb.	65
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, square, blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hexagons, blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

tons, and jobbing foundries bought about 1200 tons. The sales were for shipment during first quarter and into second quarter, the local maker not having made any change in prices. Shipping specifications are holding up well. The melt in the district is increasing, and the situation generally is promising.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b.	\$19.50 to \$20.00
Granite City, Ill.	
Northern No. 2 fdy., delivered	
St. Louis	20.66
Southern No. 2 fdy., delivered	20.42
Northern malleable, delivered	20.66
Northern basic, delivered	20.66

Freight rates: 81c. from Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Iron and Steel.—The Granite City mill has announced sheet prices for second quarter in line with those recently named by other mills. Prices on plates, shapes and bars for second quarter have not been announced, although they are being freely inquired for. Specifications against contracts have been liberal. The Granite City interest is operating its sheet and tin plate mills at full capacity and the plate mill at above 75 per cent. Warehouse business continues good in St. Louis because of the demand for structural material, but very light in the surrounding territory.

Coke.—The market for coke remains steady. The demand for domestic grades has been rather light on account of milder weather, while industrial grades are moving more freely because of the increased melt in the district.

Old Material.—The market for old material continues soft, with a few items 25c. to 50c. a ton lower. Consumers in the district have heavy backlog of orders, but they are well supplied with old material for the present. Shipments in this market have been very heavy and the mills are congested. Railroad lists include: Southern, 7300 tons; Texas & Pacific, 1600 tons; Chicago & Alton, 1400 tons; New Orleans Public Belt, 1100 tons; Louisville, Henderson & St. Louis, 10 miles of 80-lb. relaying rails; Frisco Lines, 25 carloads.

Prices per gross ton f.o.b. dealers' yards and delivered St. Louis district consumers' works:

Heavy melting steel	\$11.75 to \$12.25
No. 1 locomotive tires	12.75 to 13.25
Heavy shoveling steel	11.75 to 12.25
Miscellaneous standard-section rails, including frogs, switches and guards, cut apart	14.00 to 14.50
Railroad springs	14.50 to 14.75
Bundled sheets	8.75 to 9.25
No. 2 railroad wrought	11.75 to 12.25
No. 1 busheling	10.00 to 10.50
Cast iron borings	9.00 to 9.50
Iron rails	13.00 to 13.50
Rails for rolling	14.25 to 14.75
Machine shop turnings	7.50 to 8.00
Steel car axles	19.50 to 20.00
Iron car axles	24.00 to 24.50
Wrought iron bars and transoms	21.00 to 21.50
No. 1 railroad wrought	10.00 to 10.50
Steel rails, less than 3 ft.	15.75 to 16.25
Steel angle bars	13.00 to 13.50
Cast iron carwheels	14.25 to 14.75
No. 1 machinery cast	14.50 to 15.00
Railroad malleable	12.00 to 12.50
No. 1 railroad cast	13.50 to 14.00
Stove plate	13.50 to 14.00
Agricultural malleable	12.00 to 12.50
Relaying rails, 60 lb. and under	20.50 to 23.50
Relaying rails, 70 lb. and over	26.50 to 29.00

Birmingham

Second Quarter Pig Iron Inquiry Developing—Steel Buying Steady

BIRMINGHAM, Feb. 20.—Inquiries for second quarter pig iron, including some of large size, are more numerous and some business is being booked. The spot and March sales of the past week were at about the same level as the preceding several weeks. Shipments continue close to production. The base price of \$16 is being maintained on foundry iron. There has been no change in furnace operations, 17 being in blast.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 foundry, 1.75 to 2.25 sil.	\$16.00
No. 1 foundry, 2.25 to 2.75 sil.	16.50
Basic	15.00

Finished Steel.—Demand continues to improve and there is a steady accumulation of new tonnage.

Cast Iron Pipe.—There is a fair amount of new pressure pipe business in small lots and several large orders are expected in the near future. The market is somewhat firmer and the base price on spot business is now \$28 to \$30.

Coke.—Spot demand for foundry coke continues quiet. Shipments are in satisfactory volume. Price remains at \$5.

Old Material.—There is no noticeable change in tonnage or inquiries, both continuing at about the same rate as in recent weeks. Prices are unchanged.

Prices per gross ton, delivered Birmingham district consumers' yards:

Heavy melting steel	\$9.50 to \$10.00
Scrap steel rails	11.00 to 11.50
Short shoveling turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Stove plate	13.00 to 14.00
Steel axles	19.00 to 20.00
Iron axles	20.00 to 21.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	13.00
No. 1 cast	15.00
Tramcar wheels	12.50 to 13.50
Cast iron carwheels	12.00 to 13.00
Cast iron borings, chemical	13.50 to 14.00

Buffalo

Pig Iron Inquiry Still Pending Totals 20,000 Tons

BUFFALO, Feb. 20.—About 20,000 tons of all grades of pig iron, principally foundry iron, remains unclosed. There are several inquiries for foundry grades ranging from 500 to 3000 tons and a couple of foundry inquiries ranging between 3000 and 5000 tons. Most of the pending business is for delivery over the remainder of first half. The Kensington-Davis foundry of Buffalo has not yet closed against its 2000-ton inquiry and the General Electric Co. inquiry for 500 tons of high silicon iron for Pittsburgh is still pending. Prices remain firm at quoted levels in this district, though some of the Buffalo furnaces are shading the silicon differentials on New England business.

Prices per gross ton, f.o.b. furnace:

No. 2 plain fdy., sil. 1.75 to 2.25	\$17.00
No. 2X foundry, sil. 2.25 to 2.75	17.50
No. 1X foundry, sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	\$17.00 to 17.50
Basic	16.50 to 17.00
Lake Superior charcoal	27.28

Finished Iron and Steel.—Mill operation is better and more open-hearth steel capacity is being used. The Donner Steel Co. is now maintaining an 80 per cent rate on open-hearth operation. The Bethlehem Steel Co.'s plant at Lackawanna is running 80 per cent or better, and the Seneca Iron & Steel Co. is operating 80 per cent. Demand for bars and shapes is sustained at 1.95c., Buffalo. Sheet demand is very good. Bolt and nut makers report heavy specifying by the automobile companies. Three Batavia schools, plans on which are just out, will require around 200 tons of reinforcing bars.

Old Material.—A few sales are reported of heavy melting steel, hydraulic compressed and No. 1 busheling. The heavy melting steel sold was strictly No. 1 selected and not less than \$15.25 is said to have been obtained. The busheling and hydraulic compressed brought around \$14. Some sales of drop forge flashings are reported and there has been some strengthening of this grade. A selected small tonnage of billet and bloom crop ends brought \$18, but the market is

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes	3.40c.
Soft steel bars	2.30c.
Reinforcing bars	2.75c.
Cold-finished flats, squares and hexagons	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.30c.
Galvanized sheets (No. 24)	5.15c.
Blue annealed sheets (No. 10)	3.80c.
Common wire nails, base per keg	\$3.65
Black wire, base per 100 lb.	3.90

more nearly represented by the \$17 to \$17.50 quotation. There is a strong demand for iron axles at \$22 to \$23.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades		
No. 1 heavy melting steel	\$14.75 to \$15.25	
No. 2 heavy melting steel	13.25 to 13.75	
Scrap rails	13.75 to 14.25	
Hydraulic compressed sheets	13.25 to 13.75	
Hand bundled sheets	9.00 to 9.50	
Drop forge flashings	12.00 to 12.50	
No. 1 busheling	13.25 to 13.75	
Heavy steel axle turnings	12.75 to 13.25	
Machine shop turnings	9.00 to 9.25	
Acid Open-Hearth Grades		
Railroad knuckles and couplers	16.00 to 16.50	
Railroad coil and leaf springs	15.50 to 16.00	
Rolled steel wheels	15.75 to 16.25	
Low phosphorus billet and bloom ends	17.00 to 17.50	
Electric Furnace Grades		
Heavy steel axle turnings	12.75 to 13.25	
Short shoveling steel turnings	11.00 to 11.50	
Blast Furnace Grades		
Short shoveling steel turnings	10.75 to 11.00	
Short mixed borings and turnings	10.50 to 11.00	
Cast iron borings	10.50 to 11.00	
No. 2 busheling	9.00 to 9.50	
Rolling Mill Grades		
Steel car axles	17.00 to 17.50	
Iron axles	22.00 to 23.00	
No. 1 railroad wrought	12.50 to 13.00	
Cupola Grades		
No. 1 machinery cast	14.50 to 15.00	
Stove plate	13.00 to 13.25	
Locomotive grate bars	11.50 to 12.00	
Steel rails, 3 ft. and under	17.00 to 17.25	
Cast iron carwheels	13.00 to 13.50	
Malleable Grades		
Railroad	15.50	
Agricultural	15.50	
Industrial	15.50	

Canada

Mills Operating at a Higher Rate—Pig Iron Business Improving

TORONTO, ONT., Feb. 20.—The improvement that has featured the Canadian iron and steel industry during the past two months is reflected in higher production among the leading mills. Companies equipped to produce rails have large tonnage orders on their books and have their rail mills running practically to capacity. The Dominion Iron & Steel Co., Sydney, N. S., which has been rolling rails for the Canadian National Railways, has started its rail mill on an order of 12,600 tons of 127-lb. rails for the Michigan Central. These are the heaviest ever turned out in a Canadian rail mill.

Pig Iron.—Inquiries for second quarter delivery are making their appearance and a number of melters appear anxious to cover up to the end of June. The demand for spot iron is strong. Indications are that first quarter spot sales will stand out above those of the first three months of 1927. Melters are entering the market for lots ranging from 50 to 200 tons and occasional orders are appearing for 500 tons. Pig iron production in Canada is increasing and with six blast furnaces blowing figures for this month will surpass those of January. It is understood that the new owners of the British Empire Steel Corporation propose changes in its blast furnaces. Some of those that are now considered more or less obsolete are to be replaced with modern stacks. Pig iron prices are firm in both Toronto and Montreal markets.

Prices per gross ton:

Delivered Toronto	
No. 1 foundry, sil. 2.25 to 2.75	\$23.60
No. 2 foundry, sil. 1.75 to 2.25	23.60
Malleable	23.60
Delivered Montreal	
No. 1 foundry, sil. 2.25 to 2.75	\$25.00 to \$25.50
No. 2 foundry, sil. 1.75 to 2.25	25.00 to 25.50
Malleable	25.00 to 25.50
Basic	24.00
Imported Iron at Montreal Warehouse	
Summerlee	33.50
Caron	33.00

Old Material.—The general trend of business in this market is on the up-grade, but so far improvement has not been sufficient to warrant the advancing of prices. Consumers are buying sparingly and prefer to hold

their purchases to correspond with immediate needs. Prices are unchanged, although a little stronger.

Dealers' buying prices:

	Per Gross Ton	Per Net Ton
Heavy melting steel	\$9.00	\$8.00
Rails, scrap	10.00	10.00
No. 1 wrought	9.00	11.00
Machine shop turnings	7.00	6.00
Boiler plate	7.00	7.00
Heavy axle turnings	7.50	7.50
Cast borings	7.50	6.00
Steel turnings	7.00	6.50
Wrought pipe	5.00	6.00
Steel axles	14.00	19.00
Axes, wrought iron	16.00	21.00
No. 1 machinery cast	15.00	16.00
Stove plate	9.00	12.00
Standard carwheels	13.00	14.50
Malleable	13.00	13.00

San Francisco

Structural Steel Awards 8800 Tons Plate—Jobs Pending Total 9000 Tons

SAN FRANCISCO, Feb. 16 (By Air Mail).—Outstanding among a total of 8800 tons of structural shape awards was 6500 tons for the Physicians' Building in San Francisco which went to the McClintic-Marshall Co. Central Works. Other awards included 700 tons for transmission towers for the Southern California Edison Co., Los Angeles, and 850 tons for a church in the same city, the latter project going to McClintic-Marshall Co. and the former to the Pacific Coast Steel Co. Pending business involves over 20,000 tons. Plain material continues firm at 2.35c. c.i.f. Coast ports.

Pig Iron.—Movement of pig iron this week was limited to small lots and little of importance transpired. No change in prices is noted.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah foundry, sil. 2.75 to 3.25	25.00 to 26.00
**Indian foundry, sil. 2.75 to 3.25	24.00 to 25.00
**German foundry, sil. 2.75 to 3.25	24.25

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Plates.—Awards of plate material this week were confined to lots of less than 100 tons. However, a number of pending projects involve over 9000 tons. Bids will be opened this week in Seattle for a 2000-ton penstock and bids will be taken next week on 650 tons for a pipe line and penstock at Milton, Ore. The Southern California Edison Co. has taken bids on a 1300-ton penstock. Prices are now firm at 2.30c. c.i.f.

Bars.—In the reinforcing bar market the largest award was 210 tons for apartments in Los Angeles placed with an unnamed interest. The majority of the awards lately have been confined to lots ranging from 20 to 30 tons. In the San Francisco district considerable foreign material has been used of late and this has resulted in weak out-of-stock prices, as low as 2.25c. being named.

Cast Iron Pipe.—The only award of over 100 tons this week involved 19 tons of 4 to 8-in. class 150 pipe for Pasadena, Cal., and was secured by the American Cast Iron Pipe Co. Charles Raasche, Los Angeles, was low bidder on 156 tons of 4 to 8-in. class B pipe for the improvement of Pacific Street, Oceanside, Cal. James Young, Sacramento, was low bidder on 145 tons of 4 and 6-in. class B pipe for the State Fair Grounds at Sacramento, Cal. Bids were opened this week on 128 tons of 48-in. class A pipe for the North Oufall sewer

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes	3.15c.
Soft steel bars	3.15c.
Small angles, $\frac{1}{4}$ -in. and over	3.15c.
Small angles, under $\frac{1}{4}$ -in.	3.55c.
Small channels and tees, $\frac{3}{4}$ -in. to 2 $\frac{1}{4}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker	5.00c.
Black sheets (No. 24)	4.95c.
Blue annealed sheets (No. 10)	3.90c.
Galvanized sheets (No. 24)	5.50c.
Structural rivets, $\frac{1}{2}$ -in. and larger	5.65c.
Common wire nails, base per keg	\$3.40
Cement coated nails, 100-lb. keg	3.40

in Los Angeles. Bids were also opened on 222 tons of 4 to 8-in. class B pipe for Armona, Cal. B. Nicoll & Co. were low bidders on 1964 tons of 6 and 8-in. class 350 pipe for Los Angeles. George C. DeGolyer, Oakland, was low bidder on 526 tons of 4 to 8-in. class B pipe for the East Palo Alto Waterworks District at Redwood City, Cal. Bids will be opened on Feb. 20 for 426 tons of 4 to 12-in. pipe for the improvement of Saturn Avenue, Huntington Park, Cal., and on Feb. 21 for 136 tons of 18-in. pipe for San Diego, Cal.

Standard Pipe.—The Grinnell Co. of the Pacific was awarded 950 tons of 6-in. welded pipe and 285 tons of 6-in. wrought iron pipe for Los Angeles. E. W. Redman, Fresno, Cal., was low bidder on 150 tons of 2 to 8-in. Matheson joint pipe for the East Palo Alto Waterworks District at Redwood City, Cal. No action has yet been taken on the inquiry of the Petroleum Securities Co. for 650 tons of 3½-in. to 16-in. plain-end line pipe for its new Richmond, Cal., plant.

Cincinnati

Pig Iron Shipments Increase—Steel Specifications Lagging

CINCINNATI, Feb. 20.—There has been a further increase in the foundry melt in this district, with the result that pig iron shipments are going forward at a better rate. In many cases, however, specifications for first quarter deliveries are lagging and it will be well into the second quarter before buyers have taken all of the tonnages called for on current contracts. Sales are inconsequential in the aggregate and inquiries are scarce. The Favorite Stove & Range Co., Piqua, Ohio, has bought 600 tons of foundry iron from a Lake Erie furnace, while another company in this territory has purchased 1000 tons of malleable. Prices are unchanged with Ironton makers asking \$19 at the furnace and northern Ohio producers quoting from \$16.50 to \$17, base Cleveland. In the South, Alabama and Tennessee sellers are firm at \$16, base Birmingham. The Marting Iron & Steel Co. is reported to be preparing to blow in one of its Ironton furnaces late in March. At present none of the merchant stacks in the Ironton district is operating.

Prices per gross ton, delivered Cincinnati:

So. Ohio fdv., sil. 1.75 to 2.25...	\$20.89
So. Ohio malleable	\$20.14 to 20.89
Alabama fdv., sil. 1.75 to 2.25...	19.69
Alabama fdv., sil. 2.25 to 2.75...	20.19
Tennessee fdv., sil. 1.75 to 2.25...	19.69
Southern Ohio silvery, 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—There has been a perceptible decline in specifications against first quarter contracts for bars, structural shapes and plates. The decrease is partly attributed to the fact that contract customers in recent weeks have taken out substantial tonnages and therefore are not in immediate need of material in large quantities. Many buyers are awaiting developments on prices before authorizing releases beyond the amounts needed for current requirements. In

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes...	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinforcing bars.....	3.15c.
Rail steel reinforcing bars.....	3.00c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue annealed sheets (No. 10).....	3.60c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 annealed wire, per 100 lb.....	\$3.00
Common wire nails, base per keg.....	2.95
Cement coated nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	7.55
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.....	\$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.....	19.00
4-in.	39.00

structural steel an inquiry for 6000 tons for a highway bridge spanning the Ohio River at Maysville, Ky., has been put out, and bids are being submitted on 1700 tons for the new buildings of the L. S. Ayers Co. at Indianapolis. Aside from these two projects, however, pending work in this district is light and fabricators have found it necessary to curtail operations. Demand for wire goods has been fairly well sustained, but deviation from the recently established prices is noted. Common wire nails and plain wire are reported to have been sold at concessions of \$2 from the regular schedule of \$2.65 per keg and \$2.50 per 100 lb., base Ironton or Pittsburgh, respectively. Sheet producers declare that a limited volume of buying for the second quarter has been done, although major activities still center on the tonnages to be shipped in February and March. All consuming lines are contributing substantially to the well-filled order books of sheet manufacturers, who are holding to a production program calling for full capacity output. Prices are firmly maintained on a basis of 2.10c., Pittsburgh, for blue annealed, 2.90c. for black and 4.15c. for automobile body stock. Only in galvanized sheets for roofing purposes is there any shading of quotations, and on this grade cuts of from \$1 to \$3 a ton have been made in the South.

Foundry coke prices per net ton, delivered Cincinnati: By-product coke, \$9.52 to \$9.64; Wise County coke, \$7.59 to \$8.09; New River coke, \$10.09 to \$10.59. Freight rates, \$2.14 from Ashland, Ky.; \$2.59 from Wise County and New River ovens.

Reinforcing Bars.—Bids are being taken on 100 tons of bars for a warehouse of the Union Gas & Electric Co., this city, and on 150 tons for a building at Dayton, Ohio, for the Young Women's Christian Association. New billet bars are selling at 1.85c., base Pittsburgh, for sizable tonnages and at 1.95c. for small lots. Makers of rail steel bars continue to quote 1.80c., base mill, and only on especially desirable jobs will they go below that figure. Reports are current that producers will try to get from \$1 to \$2 a ton above present prices for second quarter orders, although no business for delivery beyond March 31 has been booked by district mills.

Warehouse Business.—While there has been a slight upward trend in the volume of sales and February tonnage will be better than that in January, business of local jobbers is running approximately 10 per cent behind that of 1927. Prices in all commodities are firm and unchanged.

Coke.—The betterment in foundry production is reflected in an increase of approximately 20 per cent in the shipments of by-product foundry coke in the first 20 days of February, as compared with January. By-product domestic grades, on the other hand, are about on a par in shipments with those of last month. The Portsmouth By-Product Coke Co. has announced that beginning March 1, it will permanently double its output of foundry coke, setting aside for this purpose a number of ovens which have been used recently in making furnace coke.

Old Material.—Steel plants in this district are authorizing the release of a fair amount of material on current contracts, and foundry grades are the most active in many weeks. However, the demand from consumers has not increased to the extent that dealers had anticipated and consequently prices have failed to advance; in fact, in certain grades a downward trend is perceived.

Dealers' buying prices per gross ton f.o.b. cars, Cincinnati:

Heavy melting steel	\$11.50 to \$12.00
Scrap rails for melting	12.25 to 12.75
Loose sheet clippings	9.00 to 9.50
Bundled sheets	9.50 to 10.00
Cast iron borings	8.50 to 9.00
Machine shop turnings	8.00 to 8.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.50 to 8.00
Rails for rolling	13.00 to 13.50
No. 1 locomotive tires	13.50 to 14.00
No. 1 railroad wrought	11.00 to 11.50
Short rails	16.50 to 17.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	16.00 to 17.00
No. 1 railroad cast	13.50 to 14.00
Burnt cast	8.00 to 8.50
Stove plate	9.00 to 9.50
Brake shoes	10.00 to 10.75
Railroad malleable	12.75 to 13.25
Agricultural malleable	12.25 to 12.75

EMPLOYEE STOCK PLAN

Purchases, Under Careful Safeguarding of Interests, May Be on Monthly Payments

AN interesting example of the tendency of manufacturers to encourage habits of thrift and systematic saving among their employees is shown in a stock subscription plan originated by the Mueller Brass Co., Port Huron, Mich. Principal among the provisions of the plan are:

1. All employees who had been in the service of the company one year, at the time the plan went into effect, receive as a gift one share of 7 per cent cumulative preferred stock.

2. The company will offer each employee who qualifies as to service the right to buy additional stock in amounts not to exceed 10 per cent of his annual earnings, exclusive of bonus payments.

3. Such stock may be purchased by the employee outright, or on monthly payments to be deducted from his pay.

4. The company will deposit each year, from 1929 to 1933, a percentage of its profits in the form of a trust fund, which will be distributed pro rata in January, 1933, to all employee stockholders who have remained in continuous employ of the company, and who at the date of the disbursement still own their stock.

5. The company agrees to repurchase at par value, upon 10 days' notice, any stock thus sold previous to the division of the participating trust fund.

6. Suitable provision will be made to protect employees' stock investment in the event of temporary unemployment, sickness or death.

The stock that is being sold under this plan is preferred and cumulative, having preference over all other classes of the company's stock with respect to assets and dividends. Paid up stock, deposited with the company, will entitle any employee to a company loan not to exceed 90 per cent of the par value. All dividends on gift and purchased shares are payable quarterly at the rate of 1 1/4 per cent each quarter.

Subscriptions may be canceled at any time through filing a written request with the secretary of the company. Within 10 days from the date of notification an employee making such a request will be paid the full amount he has paid in, plus all dividends due, less any amounts due the company. Such withdrawal automatically cancels that employee's rights to participation in the trust fund distribution.

Any purchaser who is laid off because of the temporary closing of the company's plant, or a reduction in its operating schedule, and who subsequently resumes his service, will not be deprived of any of the benefits of the plan, even though he may have found it necessary to find employment elsewhere during such suspension. The benefits of the plan are extended to all employees of the company and its subsidiaries, with the exception of company officers, and sales representatives or agents operating exclusively on a commission basis.

Sheet & Tube Stockholders to Meet March 15 to Ratify Merger

The Youngstown Sheet & Tube Co., Youngstown, has issued a call for a special stockholders' meeting March 15 at Youngstown to ratify the proposed merger with the Inland Steel Co., Chicago. A letter accompanying the official call, signed by President James A. Campbell, indicates that the transaction represents actual purchase of Inland by the Sheet & Tube company rather than a consolidation of interests. In this connection, it reads: "The officers and directors of this company believe this purchase will greatly strengthen the position of this company by the addition of the valuable good-will and resources of the Inland Steel Co., and by further diversifying its products, and that the terms of the contract are fair and for the best interests of the company. They recommend that the contract be approved by the stockholders.

"The products of the two companies are largely different and their plants are so located in different districts that there is no substantial competition between

them. The plants fit together well and can be operated together to much better advantage than apart. To preserve the valuable good-will of Inland Steel Co., it is recommended that the name of the company be changed to the Youngstown-Inland Steel Co. It is also necessary that the code of regulations of the company be changed and new directors added."

It is proposed to change the Sheet & Tube company's capital structure by changing the present authorized 1,000,000 shares to 2,000,000 shares, so that the holders thereof shall be entitled to two shares in place of every one as now authorized, and authorizing an additional amount of 1,200,000 shares.

Ohio Foundry Operations Unchanged in January

January employment reports from 64 Ohio foundries and machine shops show no change from the low level maintained since November, the index of the number of wage earners, based on an average month in 1923 as 100, standing at 82. This represents a drop of 13 per cent from January, 1927. Cincinnati, with an increase of 14 per cent, was the only city which did not show a decline. Ten steel works and rolling mills reported an improvement in employment in January for the first time since May, 1927. While the number of workmen was 7 per cent greater than in December, there was a loss of 11 per cent compared with January last year.

Statistics from 24 automobile and automobile parts manufacturers in Ohio showed that employment in January was 5 per cent ahead of December and 2 per cent better than in the corresponding month of 1927. In fact, January was the first month in the past 12 in which the number of wage earners exceeded those in the same month of the preceding year. In the Ohio construction industry, employment in January was 12 per cent less than in December and 13 per cent below January, 1927. The reports are gathered monthly by the bureau of business research of Ohio State University for publication in its bulletin.

Small Decrease in Wholesale Prices in January

Wholesale prices in January were slightly lower than in December and correspondingly lower than in January, 1927, according to the United States Bureau of Labor Statistics. The index (based on 1926) was 96.3 last month, against 96.8 in the preceding month and 96.6 in January, 1927. Changes during the month included increases in prices of farm products, hides and leather, and building materials, and decreases in prices of foods, textiles, fuel and lighting, metals and metal products, chemicals and drugs and house-furnishing goods.

Metals are listed at 98.1, compared with 98.4 in the preceding month and with 98.8 in January, 1927. This group is made up of five principal subdivisions, which are respectively iron and steel, non-ferrous metals, agricultural implements, automobiles, other metal products. There was in January a slight rise in iron and steel, from 93.7 to 93.9, compared with 99.2 a year earlier.

Fewer Mechanical Stokers Sold

Mechanical stokers sold in January are reported by the Department of Commerce at 75 units, aggregating 26,572 hp. This compares with 32,202 hp. in December and with 40,467 hp. in January, 1927. With two exceptions, the latest report shows the smallest rating for any month in more than two years.

Recommendation for the adoption of intermediate grade as the single standard for new billet reinforcing steel is contained in Commercial Standard No. 1, a bulletin recently issued by the Department of Commerce. Results of a number of conferences held by the Department in an effort to establish this standard are contained.

NON-FERROUS METAL MARKETS

The Week's Prices

Cents per Pound for Early Delivery

	Feb. 20	Feb. 18	Feb. 17	Feb. 16	Feb. 15
Lake copper, New York	14.25	14.25	14.25	14.25	14.25
Electrolytic copper, N. Y.*	13.82 1/2	13.82 1/2	13.82 1/2	13.82 1/2	13.82 1/2
Straits tin, spot, N. Y.	51.50	52.00	51.62 1/2	51.25	
Lead, New York	6.32 1/2	6.32 1/2	6.32 1/2	6.35	6.35
Lead, St. Louis	6.07 1/2	6.07 1/2	6.07 1/2	6.12 1/2	6.12 1/2
Zinc, New York	5.82 1/2	5.85	5.85	5.90	5.95
Zinc, St. Louis	5.47 1/2	5.50	5.50	5.55	5.60

*Refinery quotation: delivered price 1/4c. higher.

NEW YORK, Feb. 20.—Further weakness in tin and zinc has developed, prices the lowest in over five years having been reached in the latter. Extreme dullness still persists in copper, with a little shading here and there. The lead market is somewhat easier.

Copper.—Featureless and sluggish is the characterization of this market in all quarters. There has been almost no buying of electrolytic copper by either domestic or foreign consumers in the past week. The small purchases which American melters have made have been at a concession from the 14.12 1/2c. price maintained by all large producers—as low as 14c., delivered in the Connecticut Valley, in one or two instances. There has been hardly enough business to establish a market, but the metal has been available at concessions anywhere from 14c. to 14.07 1/2c. Copper Exporters, Inc., continues its official quotation at 14.50c., c.i.f. usual European ports, with almost no business done. The dullness is explained by some as due to an expectation by consumers of lower prices based on weakness in other metals. Lake copper is firm but quiet at 14.25c. delivered.

Tin.—Prices of tin continue to hover around the levels which were established in April, 1925, and the value of tin at present is the lowest since that period. Sales continue fairly liberal, the total for last week having been about 1050 tons. There are plenty of sellers, and buyers are able to buy all they want. Friday, Feb. 17, the situation in spot tin became acute, with sales at 51.62 1/2c. and 52.25c. bid. This was due to the temporary shortage in supplies. Saturday the acute-ness softened and the situation was still more relieved

today. The spread between spot and futures has again reached the normal of about 1/4c. Today the market has been very dull, with spot Straits tin quoted at 51.50c. Prices in London today were again a little lower than a week ago, with spot standard quoted at £230, future standard at £233 and spot Straits also at £233. The Singapore price today was £237 5s. Arrivals thus far this month have been 3015 tons, with 6280 tons reported afloat.

Lead.—Declines in the London market have caused the market here to be somewhat easier. It is stated that the metal can be bought at New York about 5 points under the contract quotation of the leading interest, which is 6.35c., New York. In the West, it is reported that some metal sold last week as low as 6c., St. Louis, but the prevailing quotation averaged about 6.07 1/2c. A fair amount of business in small lots for prompt shipment is reported.

Zinc.—New low prices for prime Western zinc have been established. The metal reached 5.47 1/2c., St. Louis, today, which is the lowest price since July 6, 1922. The market is extremely weak and it is stated that 5.45c., St. Louis, was possible today. On the rather rapid decline in the last week there has been a fairly large amount of forward buying, but the spot situation is not so easy as to supplies. Prime Western today is quoted at 5.47 1/2c., St. Louis, or 5.82 1/2c., New York, for nearby delivery. Ore at Joplin was again easier last week with some sales at \$35 per ton, as against \$36 a week ago. The production was again around 3000 to 4000 tons in excess of sales.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c., with shot nickel at 36c. and electrolytic nickel at 37c. per lb.

Antimony.—The market is a little easier, but quiet, with Chinese metal for spot delivery quoted at 10.87 1/2c., and futures at 11c. New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c. per lb. delivered.

Non-Ferrous Rolled Products

Mill prices on bronze, brass and copper products have not changed since early December, and there have been no revisions in the quotations on zinc sheets and lead full sheets.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—

High brass	18.75c.
Copper, hot rolled	22.75c.
Zinc	10.00c.
Lead (full sheets)	10.00c. to 10.25c.

Seamless Tubes—

High brass	23.62 1/2c.
Copper	24.50c.

Rods—

High brass	16.50c.
Naval brass	19.25c.

Wire—

Copper	15.75c.
High brass	19.25c.
Copper in Rolls	21.75c.

Brazed Brass Tubing

26.75c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—

High brass	18.50c. to 19.25c.
Copper, hot rolled	22.75c. to 23.75c.
Copper, cold rolled, 14 oz. and heavier	25.25c. to 26.25c.

Seamless Tubes—

Brass	23.37 1/4c. to 24.37 1/4c.
Copper	24.50c. to 25.50c.
Brazed Brass Tubes	26.50c. to 27.50c.
Brass Rods	16.25c. to 17.25c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.00c. to 10.50c.
Zinc sheets, open	10.50c. to 11.00c.

Rolled Metals, f.o.b. Chicago Warehouse
(Prices Cover Trucking to Consumers' Doors in
City Limits)

Sheets—	Base per Lb.
High brass	18.75c.
Copper, hot rolled	22.75c.
Copper, cold rolled, 14 oz. and heavier	25.00c.
Zinc	11.00c.
Lead, wide	9.75c.
<i>Seamless Tubes—</i>	
Brass	25.12 1/2c.
Copper	26.00c.
<i>Brazed Brass Tubes</i>	26.75c.
<i>Brass Rods</i>	16.50c.

Non-Ferrous Metals at Chicago

FEB. 20.—There is practically no change in this market from a week ago. Prices are fairly steady and new buying is in moderate volume. The old metal market is without feature.

Prices, per lb., in carload lots: Lake copper, 14.25c.; tin, 54c.; lead, 6.30c.; zinc, 5.75c.; in less-than-carload lots, antimony, 12.50c. On old metals we quote copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 9c.; red brass, 9c.; yellow brass, 6.75c.; lead pipe, 5c.; zinc, 3.25c.; pewter, No. 1, 34c.; tin foil, 40c.; block tin, 50c.; aluminum, 12.50c.; all being dealers' prices for less-than-carload lots.

NICKEL-CHROME STEEL RIVETS

Develop High Strengths and Impact Resistance
When Driven in Cold Plates and
Cooled Normally

LIGHT armor has been attached to tanks, gun carriages, and aircraft with ordinary rivets and bolts, which on occasion have been broken and penetrated by opposing bullets. Consequently an effort has been made to find a rivet which will drive readily, harden on slow cooling, and remain tight when cold, yet not so tight as to cause the heads to pop off when hit by a small-caliber armor-piercing bullet. Results of these studies are contained in Technologic Paper of the Bureau of Standards, No. 358, by Harry K. Herschman, entitled "Air-Hardening Rivet Steels."

Satisfactory armor has a Rockwell diamond cone hardness of 40 to 45 (Brinell 375 to 450), and a group of steels which on air cooling develop this hardness was studied. It was found that the microstructure should be fully martensitic; correct hardness could be had by steels which had more or less troostite or austenite in addition to the martensite, but the relative amount of each constituent varied widely with normal variations in cooling rates, and with corresponding wide variations in the physical properties when cold. Furthermore, it was discovered that some rivets which were driven tight when hot were loose when cold. These all had low Ar" transformation points where austenite in the hot rivet changed into the martensite of the cold rivet. This transformation causes the rivet shank to elongate, and if it occurs at too low a temperature, subsequent normal contraction on cooling will not retighten the grip. This consideration fixed a moderate limit on the carbon content. Low carbon also gave good ductility, resistance to impact, and shear strength.

Best results were had in a steel containing 0.23 per cent carbon, 0.33 manganese, 1.5 chromium and 3.75 nickel. It is somewhat cheaper than a similar steel with nickel up to 4.5 per cent, which is second choice. When driven as 1/2-in. rivets, joining 1/2-in. armor, they cooled to 415 Brinell hardness. They passed the standard hot flattening and hot bending tests satisfactorily, drove readily and remained tight when cold. Microstructure in this condition was entirely angular needle form, looking like martensite (although the authors call it "pseudo-martensite" and think that it is a mixture of true martensite and ferrite). Tensile tests on air-hardened 0.505-in. bars gave the following results:

Steel	Tensile Strength	Yield Point	Elongation in 2 In.	Reduction
3.75 Ni-Cr	200,000	170,000	10	15
4.5 Ni-Cr	170,000	170,000	0	0

One-half-in. rivets, driven in a testing fixture and

Old Metals, Per Lb., New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators and the selling prices are those charged consumers after the metal has been properly prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	12.00c.	13.50c.
Copper, heavy and wire	11.75c.	12.875c.
Copper, light and bottoms	10.00c.	11.25c.
Brass, heavy	7.00c.	8.50c.
Brass, light	6.00c.	7.50c.
Heavy machine composition	9.50c.	10.75c.
No. 1 yellow brass turnings	7.75c.	9.00c.
No. 1 red brass or composition turnings	8.75c.	9.75c.
Lead, heavy	5.25c.	5.625c.
Lead, tea	4.25c.	4.75c.
Zinc	3.75c.	4.25c.
Sheet aluminum	12.75c.	14.50c.
Cast aluminum	12.75c.	14.50c.

cooled more rapidly by contact with the cold metal, developed higher ultimate strengths. In double shear, 1/2 and 3/4-in. rivets failed at about 170,000 lb. per square inch stress. Only a small piece would be torn off the head of a rivet driven in armor plate, when hit directly by 0.30 caliber armor-piercing bullets flying at almost 2650 ft. per sec.

Other less extensive tests indicate that lower nickel and chromium will give satisfactory results if the action is intensified by adding a little tungsten or molybdenum.

REINFORCING STEEL

Awards of About 5000 Tons and New Projects
Amount to About 2700 Tons

TOTAL awards of reinforcing bars were a little more than 5000 tons. The largest was 2000 tons for a power plant at Penns Grove, N. J. Inquiries totaling about 2700 tons included 1000 tons for a loft building in New York.

BOSTON, 500 tons, Post Office garage, to Concrete Steel Co.

SCARSDALE, N. Y., 100 tons, school, to Republic Fireproofing Co.

NEW ROCHELLE, N. Y., 100 tons, bridge between Glen Island and New Rochelle for Westchester County Park Commission, to Concrete Steel Co.

PENNS GROVE, N. J., 2000 tons, power house, to Concrete Steel Co.

GREENSBORO, N. C., 180 tons, Presbyterian Church, to Truscon Steel Co.

CLEVELAND, 200 tons, Marine Hospital, to Truscon Steel Co.

DETROIT, 900 tons, building for Sears, Roebuck & Co., to Gabriel Steel Co.

CHICAGO, 220 tons of rail steel bars, apartment building at Wilson Avenue and Beacon Street, to Concrete Engineering Co.

CHICAGO, 110 tons, Women's Athletic Club, to Jones & Laughlin Steel Corporation.

CHICAGO, 700 tons, Passavant Hospital, to unnamed bidder.

LOS ANGELES, 210 tons, office building, Seventh Street and Wilshire Boulevard, to unnamed interest.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 1000 tons, loft building for V. Green Co. at Canal and Hudson Streets; Turner Construction Co., general contractor.

NEW YORK, 500 tons, building for Eletro Co.; Walte Construction Co., general contractor.

CINCINNATI, 100 tons, warehouse for Union Gas & Electric Co.

DAYTON, OHIO, 150 tons, building for Young Women's Christian Association.

CHICAGO, 200 tons, Sheridan Towers apartment building.

CHICAGO, 500 tons, Civic Opera Building; Graham, Anderson, Probst & White, architects.

ST. LOUIS, 300 tons, warehouse for Atlantic & Pacific Stores Co., Fourteenth and Poplar Streets; Austin Brothers, Chicago, general contractors.

FABRICATED STRUCTURAL STEEL

New Business Good With 44,000 Tons Pending —Awards Only 20,000 Tons

AWARDS of less than 20,000 tons registered the lowest level for a week's business since the first of the year. This total, however, consisted of a large number of small tonnage projects, the only purchases of more than 1000 tons being 6500 tons for the Physicians' Building in San Francisco and 4000 tons for the Drake Tower in Chicago. Pending business was enlarged by inquiries for about 44,000 tons. Outstanding was 6000 tons for a bridge at Maysville, Ky., 5900 tons for Mississippi River barges and 4000 tons for a hotel in New York.

EAST BARNET-PASSUMPSIC, VT., 139 tons, two bridges, to Berlin Construction Co.
BROOKLINE-NEWFANE, VT., 105 tons, bridge, to Berlin Construction Co.
NORTH ROYALTON, VT., 100 tons, bridge, to Albany Bridge Construction Co.
JOHNSON, VT., 100 tons, bridge, to Ring Construction Co.
WESTCHESTER COUNTY, N. Y., 400 tons, bridge connecting Glen Island and New Rochelle, to Bethlehem Steel Co.
NEW YORK, 250 tons, shoring beams and splice plates for subway work for Arthur A. Johnson Corporation, to Bethlehem Steel Co.
LITTLE NECK, N. Y., 375 tons, Lakeville School, to an unnamed fabricator.
ITHACA, N. Y., 700 tons, residential buildings for women, to an unnamed fabricator.
PHILADELPHIA, 250 tons, Uptown Theater and office building, to Bethlehem Fabricators, Inc.
PHILADELPHIA, 150 tons, bank and office building at Sixteenth and Locust Streets, to Bethlehem Fabricators, Inc.
PITTSBURGH, 515 tons, building for National Biscuit Co., to Fort Pitt Bridge Works.
PHILADELPHIA, 200 tons, substation for Philadelphia Electric Co., to Belmont Iron Works.
PHILADELPHIA, 125 tons, bridge over Carpenter Street, to McClintic-Marshall Co.
PHILADELPHIA, 265 tons, George W. Childs Public School, to McClintic-Marshall Co.
CONNELLSVILLE, PA., 100 tons, Capstan Glass Co. addition, to Pittsburgh Bridge & Iron Co.
PITTSBURGH, 200 tons, Kuhn recreation building, to Guibert Steel Co., Pittsburgh.
PITTSBURGH, 500 tons, Ambassador Apartments, to McClintic-Marshall Co.
MAYVIEW, PA., 510 tons, Pittsburgh Municipal Hospital, 300 tons of standard sections to John Eichleay, Jr. Co. and 210 Junior beams to Jones & Laughlin Steel Corporation.
TORONTO, ONT., 200 tons, Junior beams for 28-story tower, *Toronto Star*, to Jones & Laughlin Steel Corporation.
CLEVELAND, 100 tons, laboratory for American Gas Association, to Wellman-Seaver-Morgan Co.
CHICAGO, 100 tons, transformer station for Commonwealth Edison Co., to Vierling Steel Works, local.
CHICAGO, 100 tons, railroad bridge and turn-table repairs, to Vierling Steel Works.
CHICAGO, 600 tons, building for Campbell Soup Co., to Hansell-Elcock Co., local.
CHICAGO, 4000 tons, Drake Tower, to American Bridge Co.
EL PASO, TEX., 1000 tons, refinery for Standard Oil Co., to Chicago Bridge & Iron Co.
ST. LOUIS, 100 tons, repairs to Famous & Barr Co. store, to Mississippi Valley Structural Steel Co.
LOS ANGELES, 700 tons, transmission line, Southern California Edison Co., to Pacific Coast Steel Co.
LOS ANGELES, 850 tons, synagogue, Wilshire and Hobart Boulevards, to McClintic-Marshall Co.
SAN FRANCISCO, 6500 tons, Physicians Building on Sutter Street, to McClintic-Marshall Co.
SAN FRANCISCO, 130 tons, apartment building, Sixteenth Avenue and Lincoln Way, to Judson-Pacific Co.
OAKLAND, CAL., 300 tons, telephone building, Forty-fifth Street and Telegraph Avenue to Judson-Pacific Co.
OAKLAND, 100 tons, warehouse, Twenty-fourth and Peralta Streets, to Pacific Coast Engineering Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

WEYMOUTH, MASS., 123 tons, town office building.
BURLINGTON, VT., 500 tons, bridge over Winooski River; bids March 1.

NEW YORK, 4000 tons, Governor Clinton Hotel at Seventh Avenue and Thirty-first Street.

BROOKLYN, 900 tons, theater for Allied Owners' Corporation.

PHILADELPHIA, 1800 tons, building for Integrity Trust Co., Sixteenth and Walnut Streets; Levgar Structural Co., New York, reported low bidder.

DELAWARE, LACKAWANNA & WESTERN RAILROAD, 900 tons, bridge work.

PENNSYLVANIA RAILROAD, 800 tons, bridges.

CUMBERLAND, MD., 3000 tons, building for Celanese Corporation of America.

WHEELING, W. VA., 2400 tons, six covered and 10 coal barges for Wheeling Steel Corporation.

CREIGHTON, PA., 1000 tons, plant for Pittsburgh Safety Glass Co.

PITTSBURGH, 3000 tons, C. B. Connelley Trade School.

PITTSBURGH, 750 tons, Stanley-Clark theater.

PITTSBURGH, 1600 tons, nine cargo barges for Union Barge Line Corporation.

MEMPHIS, TENN., 3900 tons, 39 barges for Mississippi River Commission; bids to be opened March 3.

MAYSVILLE, KY., 6000 tons, highway bridge across Ohio River; bids close March 24.

VICKSBURG, MISS., 300 tons, two barges for United States Engineers.

INDIANAPOLIS, 1700 tons, building for L. S. Ayers Co.

COLUMBUS, OHIO, 350 tons, power house at Ohio State University.

PEKIN, ILL., 300 tons, bridge for Chicago & Illinois Midland.

PETERSBURG, ILL., 300 tons, bridge for Chicago & Illinois Midland.

CHICAGO, 825 tons, north approach to the LaSalle Street bridge; R. H. Simpson, low bidder.

CHICAGO, 3000 tons, Robey Street viaduct and approach, Great Lakes Dredge & Dock Co. general contractors.

SHREVEPORT, LA., 450 tons, viaduct.

AMARILLO, TEX., 1800 tons, office building for Atchison, Topeka & Santa Fe Railroad.

CORPUS CHRISTI, TEX., 1200 tons, warehouse for Planters & Shippers Compress Co.

ST. LOUIS, 100 tons, warehouse for J. C. Penney Co.

SAN FRANCISCO, 100 tons, bridge over Colorado River, Grand Canyon National Park; bids Feb. 20 by United States Bureau of Public Roads.

MILTON, ORE., 650 tons plates, 48 in. penstock; bids in.

REDWOOD CITY, CAL., 100 tons, pipe line for East Palo Alto Waterworks District; bids opened.

SEATTLE, WASH., 2000 tons plates, penstock for city; bids opened.

OLYMPIA, WASH., 235 tons, Wind River bridge; general contract to Gilpin Construction Co., Portland, Ore.

RAILROAD EQUIPMENT

Only 650 Cars Ordered and 200 Under Inquiry —31 Locomotives Bought

CAR awards included 500 flat cars by the Union Pacific and 150 ballast cars by the Chicago, Burlington & Quincy. The Minneapolis, St. Paul & Sault Ste. Marie is in the market for 200 box cars and the Berwind-White Coal Mining Co. is inquiring for 1200 mine cars. Locomotive purchases included 30 industrial engines by the Russian Railway Commission.

Union Pacific has ordered 500 flat cars from Bettendorf Co.

Baltimore & Ohio is reported to have placed 2000 steel box car bodies with Standard Steel Car Co.

Chicago, Burlington & Quincy has ordered 150 ballast cars from Rodger Ballast Car Co.

Minneapolis, St. Paul & Sault Ste. Marie has placed eight baggage and smoking cars with Pullman Car & Mfg. Corporation and is inquiring for 200 box cars.

Berwind-White Coal Mining Co. has made inquiry for 1200 mine cars.

Central Railway of Brazil has purchased 12 passenger cars from American Car & Foundry Co.

Nashville, Chattanooga & St. Louis has ordered 500 center constructions from Tennessee Coal, Iron & Railroad Co.

Sinclair Refining Co. is inquiring for five coke cars.

Russian Railway Commission has ordered 30 industrial locomotives from George D. Whitcomb Co., Rochelle, Ill.

Union Pacific has ordered 15 passenger and 10 dining cars from Pullman Car & Mfg. Corporation.

Alabama Stock Dock has ordered one locomotive from American Locomotive Co.

PERSONAL

Louis Wiard has been elected president of the Wiard Plow Co., Batavia, N. Y., returning to the organization after an absence of 13 years. He first became associated with the company in 1898, and 10 years later became superintendent of the plant. He left the company in 1915 to become State industrial commissioner of New York, retaining, however, his interest in the company and retaining the title of vice-president. Mr. Wiard succeeds Arthur G. Hough, who has been president of the company since 1914 and treasurer since 1902. He became interested in the plow company at the same time as Mr. Wiard, and will continue as a director and vice-president.

R. L. Balzer, for 11 years general manager of the Clyde Equipment Co., Portland, Ore., has organized the Balzer Machinery Co., with offices at 267½ Oak Street, Portland, and will represent several lines of contractors' and loggers' machinery, including that of the Ohio Locomotive Crane Co., Bucyrus, Ohio. His territory will include Oregon and southwestern Washington.

Paul S. Seck, formerly in the Chicago branch of the Columbia Tool Steel Co., Chicago Heights, Ill., has resigned to become associated with the Ziv Steel & Wire Co., 2945 West Harrison Street, Chicago.

W. B. Arbuckle has been placed in charge of a new sales office which has been opened at 1006 Washington Avenue, Houston, Tex., by the Wagner Electric Corporation, St. Louis. He has been associated with the company for 12 years, most recently as manager of the Kansas City, Mo., service station. Previously he served in a similar capacity at Omaha, Neb., and before that was employed in the production, ignition test, research and engineering departments of the corporation at its factory.

Earl R. Nichols, formerly with the Service Steel Co., Detroit, has joined the Peter Smith Heater & Mfg. Co., Fordson, Mich., and will devote his time to developing pressed steel stamping business for that company.

Francis O. Carfer has been appointed metal sales manager of the Republic Metalware Co., Buffalo, succeeding the late W. F. Hopkins. He entered the sheet metal business 17 years ago as representative in Ohio, Indiana and Michigan for the Tiffin Art Metal Co., Tiffin, Ohio. Later he served as sales manager for the Kanneberg Roofing & Ceiling Co., Canton, Ohio, going from that company to the J. M. & L. A. Osborn Co., Cleveland, for which he later served as Buffalo branch manager. He joined the Republic company last year.

O. C. Ferens and R. C. Nelson have been appointed managers of the New York and Chicago offices, respectively, of the Keasbey & Mattison Co., Ambler, Pa., manufacturer of insulating materials.

R. B. Vessey, for several years general superintendent of the tool room and automatic department of the AC Spark Plug Co., Flint, Mich., has been made assistant to the management of the company. Before going with the AC organization he was engaged in the development of experimental machines for the Buick Motor Co. Louis B. Berge, who has been associated with the AC company for 12 years, most recently as general superintendent of plants Nos. 1, 2 and 3, has been appointed manager of manufacturing. George Mann, Jr., recently assistant comptroller, has been advanced to assistant secretary-treasurer and has been succeeded by Walter J. Langdon, formerly supervisor of the tabulating and payroll department.

Myron A. Wick, who has been vice-president of Steel & Tubes, Inc., Cleveland, has been elected president of that company, succeeding his brother, Hugh B. Wick, who has been made chairman of the board. The new president has been associated for 14 years

with the company and its predecessor, the Elyria Iron & Steel Co. J. L. Sussman has been elected first vice-president in charge of the Brooklyn plant. Lyman Bartlett has succeeded Harris Sussman as a director.

Earle F. Heffley has been appointed sales manager of the Morse-Rogers Steel Co., Cleveland, steel jobber. A. J. Decker has been named assistant sales manager. Mr. Heffley had been connected for some time with the Betz-Pierce Co., Cleveland.

J. W. Collins, superintendent of the Detroit foundry of the Aluminum Co. of America, addressed the Quad-City Foundrymen's Association on Feb. 20 at the LeClaire Hotel, Moline, Ill.

John E. Frederick, general manager of the Kokomo Steel & Wire Co., Kokomo, Ind., has announced his candidacy for the governorship of Indiana.

Ralph E. Frey and J. E. Ledeboer have been elected vice-presidents of the Asbestos Shingle, Slate & Sheathing Co., Ambler, Pa. Mr. Frey, who has been secretary and sales manager, will continue in charge of the company's products. H. R. Weaver has been elected secretary.

James H. McGraw, president McGraw-Hill Publishing Co., New York, was awarded the Harvard Gold Medal for distinguished service to advertising at a dinner held Feb. 17 at the Faculty Club, Boston. The medal is one of the 10 awards established in 1923 by Edward Bok.

O. D. Fries has been placed in charge of consumer motor sales in the Detroit territory for the Lincoln Electric Co., Cleveland. He is a graduate of the Glasgow Royal Technical College and Glasgow University, Glasgow, Scotland, and has had varied experience in practical and theoretical engineering and sales work.

J. H. Mull has retired as president of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, and has been succeeded by H. Birchard Taylor, who is also president of the Cramp-Morris Industrials, Inc., which was formed to take over some of the departments and subsidiary properties of the Cramp company when liquidation was undertaken about a year ago.

E. C. Brandt, recently works manager at the Homewood works of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and F. J. Shirling, who has been superintendent of motor apparatus, have been appointed assistant works managers of the company. J. E. Webster, formerly engineer of works for the Westinghouse organization, has been made chief plant engineer. A. E. Kaiser, who has been assistant works manager, East Pittsburgh works, has been made director of production for all works, and S. C. Hoey, since 1926 superintendent of the manufacturing engineering department, has become works manager of the Homewood renewal parts works.

George F. Davie, vice-president and treasurer of the Interstate Iron & Steel Co., Chicago, left this week for a vacation trip through northern Africa, Greece, Italy and France.

Oscar Egan, an assistant engineer with the Minneapolis Steel & Machinery Co., Minneapolis, has resigned to become chief engineer for the Hart-Parr Co., Charles City, Iowa.

W. S. Peddie has been appointed treasurer of the Minneapolis Steel & Machinery Co., Minneapolis. He will also continue as comptroller and succeeds as treasurer E. A. Merrill, who has retired after 25 years of service with the company.

H. C. Camp has been appointed receiver of the H. D. Smith Co., Southington, Conn., maker of drop forgings, by the United States District Court, Hartford, Conn.

George P. Aborn, formerly manager Blake & Knowles Works, Worthington Pump & Machinery Corporation, Cambridge, Mass., has become associated with the industrial department of the Harvard Trust Co., Cambridge

George W. Thurston, vice-president American Screw Co., Providence, R. I., has been made general manager of the company. Paul C. Nickerson, a director, has been made a vice-president.

George J. Green, of the Pittsburgh Welding Corporation, Pittsburgh, is to be the speaker at the regular monthly meeting of the Pittsburgh section, American Welding Society, at the William Penn Hotel on Wednesday evening, Feb. 29. His subject is to be "Miscellaneous Welding and Repair Work."

G. Burki, formerly salesman with the E. L. Essley Machinery Co., Chicago, has joined the Chicago sales force of Manning, Maxwell & Moore, Inc., 27 North Jefferson Street, machinery dealer.

Dr. Colin G. Fink, professor of electrochemistry Columbia University, New York, lectured recently to the graduate students of Yale University on "Corrosion, Its Cause and Prevention." He emphasized in particular the modern electrolytic method for the prevention of corrosion of boilers, which method likewise does away with the formation of boiler scale. He also referred to the new development in electroplating of chromium on steel, a process for which Doctor Fink's laboratory has been responsible.

Alexander Dow, head of the Detroit Edison Co. and president of the American Society of Mechanical Engineers, was the guest of honor at the monthly dinner meeting of the Engineers' Society of Milwaukee on Feb. 15 and spoke on "Detroit Edison Power Plant Problems." The session was under the auspices of the Milwaukee section of the American Society of Mechanical Engineers. Mr. Dow was a guest of Gen. Otto H. Falk, president Allis-Chalmers Mfg. Co., during his stay in Milwaukee.

H. A. Sedgwick, superintendent of the Cutler-Hammer Mfg. Co., Milwaukee, manufacturer of electrical controlling devices, has been made manager of operations. A. E. Rauch has been appointed assistant superintendent.

C. I. Auten, M. T. Clark and C. D. Loveland have been made vice-presidents of the Truscon Steel Co., Youngstown, Ohio. Mr. Auten has been with the company 17 years and will be in charge of the standard building division. Mr. Clark, with the company nine years, was formerly an architect in California; he will supervise the steel window department. Mr. Loveland has been in charge of sales for the company in the Pittsburgh district and in his new capacity will have charge of sales in New Jersey, with headquarters in Newark.

Pacific Northwest Iron and Steel Leaders to Hold Conference

Expansion of Pacific Northwest business, development of markets and correction of trade abuses are to be considered at a conference of iron and steel industry leaders in the Pacific Northwest at the Winthrop Hotel, Tacoma, Wash., Feb. 27. The conference will be the first of its kind in that territory and is expected to result in the formation of the Northwest Iron and Steel Conference. Problems common to the manufacturer, the fabricator, the foundry operator and the distributor of steel products will be considered as a whole and will be followed by trade group meetings for considering individual problems relating to each division of the industry.

The Gartshore, Thompson Pipe & Foundry Co., Hamilton, Ont., is completing erection of a new plant for manufacture of cast iron pipe by the centrifugal process.

Benjamin Talbot New President of Iron and Steel Institute

The annual meeting of the Iron and Steel Institute will be held Thursday and Friday, May 3 and 4, at the House of the Institution of Civil Engineers, Great George Street, London, England. At this meeting Benjamin Talbot will assume office as the president for the year 1928-1929, and the meeting will take place under his presidency. Mr. Talbot is the inventor of the continuous process for making steel which bears his name. Born in 1864, he went to the United States in 1890. His first work here was the management of a steel works at Chattanooga, Tenn. In 1893 he went to what is now the Pencoyd Works of the American Bridge Co. at Philadelphia, as manager. Returning to England in 1900 he introduced the continuous process which he had meanwhile invented. He also originated a mechanical gas producer and is credited with several improvements in open-hearth and reheating furnaces.

The autumn meeting of the institute is announced as scheduled to be held in Bilbao, Spain, and the neighboring mining districts, Sept. 24 to Oct. 2.

Philadelphia Steel Club Holds Its Tenth Annual Dinner

The Steel Club of Philadelphia, an organization of steel company sales managers, held its tenth annual dinner at the Manufacturers' Club, Philadelphia, Friday evening, Feb. 17. It was attended by more than a hundred purchasing officials of Eastern companies as guests of the 35 members of the club. The dinner was followed by an elaborate vaudeville entertainment which had been arranged by the club's entertainment committee consisting of W. H. Dickson, chairman; R. H. McCracken and W. W. Deal. Officers of the club are: J. B. De Wolf, Trumbull Steel Co., president; W. S. Haring, Alan Wood Iron & Steel Co., vice-president; F. J. Krouse, Bethlehem Steel Co., secretary and treasurer.

Foundrymen Nominate New Officers

At a meeting of the nominating committee of the American Foundrymen's Association, in Cleveland, Feb. 6, the following were nominated as officers and directors of the association:

For president to serve for one year:
S. T. Johnston, vice-president and general manager, S. Obermayer Co., Chicago.
For vice-president to serve for one year:
Fred Erb, president Erb-Joyce Foundry Co., Detroit.
For directors to serve three-year terms each:
S. W. Utley, vice-president, Detroit Steel Casting Co., Detroit.
L. W. Olson, works manager, Ohio Brass Co., Mansfield, Ohio.
B. H. Johnson, works manager, Cresson-Morris Co., Philadelphia.
Peter J. Krentz, vice-president and works manager, Buffalo Foundry & Machine Co., Buffalo.
C. E. Hoyt, executive secretary, Chicago.

Massey-Harris Co., Ltd., Toronto, has purchased the J. I. Case Plow Works, Racine, Wis. The Massey-Harris Co., large manufacturer of farming implements exercised an option dated Feb. 14, 1924, it is said, and purchased all of the plow company's assets and good will.

OBITUARY

THOMAS DEVENNY, manager of lines of the Portsmouth By-Product Coke Co., Portsmouth, Ohio, died Feb. 13, following an operation at University Hospital, Philadelphia. He was well known in the eastern Kentucky coal fields, having made his home at Freeburn, Ky. In addition to his duties with the Portsmouth company, he was president of the Williamson Coal Co., Edgerton, W. Va. He was 39 years of age.

JAMES W. NELSON, for many years manager of Richard Dudgeon, Inc., New York, and actively engaged in that time in designing and developing hydrostatic apparatus, died Feb. 16 at Altadena, Cal., where he had gone a few years ago for his health. He was born in Cambridge, Ohio, 60 years ago, and received his early education in Lawrence, Kan. He was a member of the Sons of the Revolution, the American Society of Mechanical Engineers, the American Society of Civil Engineers and the Brooklyn Engineers' Club, serving as president of the last named organization.

CHARLES W. HESSLER, manager of the Gloucester, N. J., plant of the American Radiator Co., died on Feb. 14 at his home in Haddonfield, N. J., aged 38 years. Before going with the radiator company he was identified with the Buffalo plant of the Austin-Arcola Co. and previously had been associated with his brother, the late George Hessler, in the Hessler Foundry & Mfg. Co., Oswego, N. Y.

JOSEPH FARRIS, for many years identified with the Farris Furnace Co., Springfield, Ill., died on Feb. 7.

FAY B. ZOPF, vice-president of the Youngstown Boiler & Tank Co., Youngstown, Ohio, died Feb. 15 at his home in Youngstown, aged 47 years. He had been connected with the Youngstown company for four years, and for 23 years previously had been associated with the Riter-Conley Co., Pittsburgh, for a number of years as sales manager.

ALBERT CLAUDE LUDLUM, president New York Engineering Co., New York, died on Feb. 15 at the Fifth Avenue Hospital in that city. He was born in Brooklyn in 1867 and in 1889 went to Denver, where he entered the employ of the Kennedy & Pierce Mfg. Co., maker of mining machinery. He returned to New York in 1895 to become sales engineer and manager of James Beggs & Co., machinery dealers. He left that company in 1906 to organize the New York Engineering Co., with plant at Yonkers, N. Y., to manufacture mining and dredging machinery and equipment. He was a member of many engineering societies and clubs.

M. COCHRANE ARMOUR, for many years a partner in Rogers, Brown & Co., now Rogers Brown & Crocker Brothers, Inc., died Feb. 15 at his home in Pasadena, Cal. He was born at Auburn, N. Y., and went to Chicago in 1895, managing the local office of Rogers, Brown & Co. from that date until 1916. He was a director of the Chicago Short Line Railway, vice-president of the Rogers Iron Mining Co., president of the Iroquois Iron Co. and a director of the Rogers-Brown Ore Co. and the Lake Superior Iron & Chemical Co.

ROBERT LIVINGSTON IRELAND, formerly a member of the firm of M. A. Hanna & Co., Cleveland, died in his apartment at the Hotel Seymour in New York, Feb. 17, aged 60 years. He was born in Stratford, Conn., and after graduation from Yale University in 1890 he located in Cleveland, where he was employed by the Cleveland Hardware Co. In 1899 he took an active part in consolidating some of the shipbuilding interests of the Great Lakes into the American Shipbuilding Co., of which he was vice-president until 1903. He became a member of M. A. Hanna & Co. in 1904, having previously married a daughter of the late H. M. Hanna. He was very active in all the affairs of that firm, al-

though he devoted particular attention to its finances. He retired from the Hanna firm in 1918 and since then has made his home in New York. During his active business career he was associated with two Cleveland banks and with several Eastern corporations.

Era of Individualism Passing

(Concluded from page 531)

edy is equally obvious. Owen B. Young, chairman of the board of the General Electric Co., has said that the solution of business problems lies in group action. Charles M. Schwab has made the statement that cordial cooperation among the various elements of the steel industry would be worth more than a billion dollars.

"James A. Farrell, president of the United States Steel Corporation, has always advocated a general adoption of the principle of cooperation in the place of ruinous competition, as a means of bringing about more stable conditions and better profits in the steel industry. Close and mutually helpful relations between the producing mills and their intermediate industries constitute an essential step in achieving such cooperation.

"The mills have a well defined responsibility in the movement of their products to the ultimate consumer. Intermediate industries, otherwise designated as distributers, are in most instances essential to efficient distribution. Public interest demands service based upon the most economical system of distribution, and responsibility for such service rests equally upon producer and distributer. It continues until the public's requirements have been adequately met.

"Structural steel, steel pipe, tanks, boilers and other steel products have suffered a drastic shrinkage in their markets, due largely to lack of cooperation in the past between the producing mills and the distributing industries. I believe, however, that this state of affairs is destined to show marked improvement in the not distant future.

Volume Should Not Be the Chief Aim

"In a number of our key industries there is actually severe trade depression due largely to methods that have obliterated all semblance of salesmanship. If the tendency in this direction continues at its present rate it threatens to develop into trade prostration of the worst kind. In my opinion, the best hope of checking this trend lies in convincing our executives that volume is not the sole aim of business.

"We must learn that fair volume coupled with fair profit is far more desirable than maximum volume coupled with minimum profit or no profit at all. We must learn that a million times nothing is still nothing.

"Price-cutting is a direct result of unreasonable greed for business, and rancorous, cut-throat competition is a direct result of price-cutting."

Republic-Trumbull Merger to Become Effective May 1

Merger of the Trumbull Steel Co. and the Republic Iron & Steel Co., approved last week by about 94 per cent of the outstanding preferred and common stock of the Trumbull company, following a previous approval by Republic shareholders, is expected to become effective as of May 1. Headquarters will be in Youngstown, and the Trumbull properties will be known as the Trumbull division of the Republic company.

The Interstate Commerce Commission has suspended until Sept. 15 proposed increased rates on railroad car material in carloads between points in Illinois Classification Territory. The schedules would increase from 17.5c. to 22c. per 100 lb. the rates from Chicago to Mount Vernon, Ill., and East St. Louis, Ill., 15½c. to 17c. to Moline, Ill., from Mount Vernon and Chicago and from 9½c. to 12c. from Mount Vernon to Belleville, Ill.



BOOK REVIEWS

Economics of Instalment Selling. By Prof. Edwin R. A. Seligman, Columbia University. A Study in Consumers' Credit, With Special Reference to the Automobile. Vol. I, 357 pages; Vol. II, 623 pages; with numerous charts and tables in the text. Harper & Brothers, New York. Price, \$8.00.

These books contain the results of a year's investigation, undertaken for General Motors Corporation, in which the author had the help of several colleagues and assistants. Volume I contains a brief statement of the facts which are known about instalment selling, and an outline of the course of reasoning pursued to reach the general conclusion that instalment selling of durable goods to responsible consumers is a healthy development in modern trade. Volume II contains a series of appendices, giving in considerable detail the results of special studies undertaken to get the more essential facts, which were missing.

These volumes are to be heartily commended for several reasons. They contain an orderly analysis of a distinctly modern problem by a leading economist. They are very readable. The appendices will prove a mine of information on such things as the amount and variety of goods now being bought on instalments, the selling methods, the financing of motor car retailers, the used car problem and the defaults which occurred during the anthracite strike in 1926.

It is reported that the study was undertaken to give one of the leading automobile producers an answer to the very practical question, "Is it good public policy to encourage purchasing on the instalment plan?" Professor Seligman states that in 1925, out of an estimated total retail sales of all commodities of 38 billion dollars, no less than 5 billion dollars was negotiated on instalments, and the average amount of instalment paper outstanding was 2.2 billion dollars. Toward the end of the discussion, the author reaches the view that this paper is essentially the same as any other credit since it rests on the character of the borrower, that it does not involve utilization before payment (because the utilities of the motor car, piano or other purchase last much longer than the payment period), that it is just as liquid as the more conventional producers' credit, and that the total volume of instalment credit, even though growing, is inconsiderable in relation to the total credit of all kinds. Consequently he holds that instalment selling contains no special hazard to the banking system. Furthermore, in times of business depression, when producer's credit is overexpanded, instalment paper can be sharply curtailed, and therefore would not intensify industrial stagnation. On the contrary, Professor Seligman says it may even be distinctly beneficial in the recovery period, by starting the flow of commerce from producer to consumer more quickly than if the consumer had to wait until all his losses were repaired and his savings reestablished to the point where he could purchase the more expensive articles.

Professor Seligman attacks the distinction ordinarily made between production and consumption, and by a process of reasoning which to the reviewer does not seem entirely convincing comes almost to the conclusion that consumption is production. It goes something like this: Production is defined as the creation of wealth and of the productive efficiency which renders future wealth more easy of attainment. Consumption is defined as the utilization of wealth for the satisfaction of the personal wants of the user. Wise consumption increases the ability of the consumer to produce wealth. If you follow thus far, you then agree that "utilization of wealth that we call production is from one point of view not to be distinguished from utilization of wealth that we call consumption." These mental exercises are apparently necessary in order to remove the economic stigma which seems to attach to consumers and consumption (from which

production is free), and apparently growing out of the economists' premise that the greatest good is reached where the greatest surplus of wealth is being produced. In passing, it may be remarked that this premise may be doubted, indeed has been doubted among others by a Philosopher who was brought up at Nazareth and whose teachings are still widely respected.

Considerable space is given to the question whether instalment selling increases wasteful luxury. It is concluded that the automobile is not a reprehensible luxury because its consumption is neither wasteful nor destructive of material wealth nor of economic welfare; in fact, in all but a small percentage of instances, it creates a surplus of material or psychical utilities, or at least is neutral—neither creative nor wasteful. Few people would condemn the automobile unreservedly; the balance of good it has brought far outweighs the preventable abuses and misuses.

All, however, is not rosy. Attention is called to serious abuses which have appeared in the method of selling and the surcharge for the convenience. It has been said by critics of instalment selling that it changes the buyer into a virtual slave of the usurer, and involves a long train of baleful influences. If the added price of instalment buying is figured as interest on money payments deferred, it will work out to 27 per cent per annum, or more, but it is pointed out that the "finance charge" must cover more than mere interest on the deferred payments; it includes such items as credit analysis, collections, losses by occasional default, insurance, and readiness to serve. Whether this costs more than it is worth can only be determined by asking the consumer, a thing which has yet been done only once. In the State of Oregon a questionnaire was answered by 2105 people who had bought various articles on the instalment plan. About 60 per cent believed that the method was not of advantage to them. Professor Seligman dismisses this, the only real information on the point, rather cavalierly with the observation that the conclusions "are partial and fragmentary . . . of relatively minor importance." While it is not so stated, the reader gathers that the author believes that the large growth of instalment selling is evidence enough that the buyer does not object—that he feels he is getting his money's worth. Yet growth of instalment selling could as well result from intensive salesmanship, or from an over-extension of instalment purchases, to the point where a great number of consumers never are out of debt.

That these alternative suggestions are of some bearing may be concluded from what appears to be the creed of the General Motors Acceptance Corporation: "Largest possible down payment; shortest time for balance." Such a plan reduces the risk and increases the profit of the finance corporation, and simultaneously cures many of the admitted evils growing out of reckless use of other people's property by irresponsible persons. Such a policy, combined with careful analysis of the credit of prospective purchasers, has enabled the General Motors Acceptance Corporation to keep its percentage of losses in 1926 from delinquencies to 0.035 per cent of the volume of total retail paper purchased. Compare this with 1.75 per cent, an average for many other finance companies in 1925; or with 0.10 per cent losses of the Morris Plan banks; or with 0.20 per cent losses on producers' credit advanced by commercial banks; or 25 per cent when selling furniture on instalments in poorer districts.

With all these considerations in view, Professor Seligman's conclusion is obvious: that when instalment selling is good, it is very good. When instalment selling is bad (that is, not restricted to what loan brokers call "prime names," or utilized for other than durable goods, or extended in large amounts and for long times), it is bad from abuses which may be corrected, and in part are self-correcting. E. E. T.

Bounties and Rebates Feature Markets

British and German Schemes to Augment Exports Are Active—
Price Trends Uneven

(By Cablegram)

LONDON, ENGLAND, Feb. 20.

CLEVELAND pig iron is active and producers are well sold, but they complain that prices are insufficiently remunerative, as costs are increasing. Export demand is improving, but so far actual sales are still meager. Hematite prices are easy.

Foreign ore is strong, due to the Swedish strike, but British consumers already have bought most of their needs.

Finished steel, generally, is quiet as regards export, but the domestic demand is improving. The Steelmakers' Association has advanced its prices of plates, angles and sections, to domestic users, by 5s. (\$1.22) a ton, increasing by a similar amount the rebate to users who are participating in the rebate scheme. It is hoped thereby to attract other users.

Tin plate inquiry is good, but business is irregular,

as buyers are hoping to secure their supplies at the schedule price. Some mills are accepting this figure, but most of them are holding out for 18s. (\$4.39) or upward, basis, IC, f.o.b. works port, as their order books are filled for some months in advance.

Galvanized sheets are active and makers of the heavy gages are now well placed. There is moderate demand for black sheets to Japanese specifications, both thick and thin gages.

On the Continent of Europe

Continental iron and steel markets are strong, based on good demand and a reluctance on the part of the works to accept offered orders, especially on semi-finished steel and joists (beams). British sheet rollers have paid 96s. (\$23.39) a ton f.o.b., for sheet bars.

German pig iron production in January is now placed at 1,180,000 (metric) tons.

GERMAN PRICE RISE OPPOSED

Consumers Protest That They Cannot Pass on Higher Cost and Ask Investigation

BERLIN, GERMANY, Feb. 1.—The recent advance in prices by the Ingol Steel Syndicate has brought protests from consuming industries. The new level of steel prices has forced manufacturers, such as the machinery builders, to make slight advances in their prices and the machinery industry points out that even a small increase gives an advantage to importers of foreign machines, particularly American. As a result of the rise in prices, the export bounties have been correspondingly increased, but German manufacturers complain that while they will lose nothing in their export trade by the price revision, German consumers will not accept higher domestic prices.

The bounties being offered to exporting manufac-

turers at present are: Steel ingots and blooms, 24m. (\$5.72) per ton; slabs, 27m. (\$6.44); structural shapes, 35m. (\$8.35); steel bars, 36m. (\$8.59); wire rods, 21.50c. (\$6.13); heavy gage sheets, 24m. (\$5.72); and boiler tubes, 80m. (\$19.08).

Consumers are protesting to the Government against the revision of prices, pointing out that since the foundation of the International Steel Cartel the difference between the domestic and world market prices has been increased, although the cartel was expected to bring about higher export prices. Consumers believe that members of the steel syndicate are exploiting their home market, and there is a demand for anti-syndicate legislation, similar to American anti-trust laws. Although supporters of the steel syndicate in the Reichstag argue that the Government has not sufficient cause for applying existing legislation regulating cartels, the Minister of Industry, Dr. Curtius, has acted under the section of the law which requires producing cartels to

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.87 per £ as follows:

Durham coke, del'd.	£0 18s.	to £0 18 $\frac{1}{4}$ s.	\$4.39 to	\$4.45
Bilbao Rubio ore*	1 1 $\frac{1}{2}$		5.24	
Cleveland No. 1 fdy.	3 7 $\frac{1}{2}$		16.44	
Cleveland No. 3 fdy.	3 5		15.83	
Cleveland No. 4 fdy.	3 4		15.59	
Cleveland No. 4 forge	3 3 $\frac{1}{2}$		15.46	
Cleveland basic (nom.)	3 15	to 3 15 $\frac{1}{2}$	18.27 to	18.39
East Coast mixed	3 9	to 3 10	16.80 to	17.05
East Coast hematite	3 9 $\frac{1}{2}$	to 3 10 $\frac{1}{2}$	16.93 to	17.17
Rails, 60 lb. and up.	7 15	to 8 0	37.75 to	38.96
Billets	6 0	to 6 10	29.22 to	31.66
Ferromanganese	13 10		65.75	
Ferromanganese (export)	13 0	to 13 5	63.31 to	64.53
Sheet and tin plate bars, Welsh	5 7 $\frac{1}{2}$	to 5 15	26.18 to	28.01
Tin plate, base box	0 17 $\frac{1}{4}$	to 0 18 $\frac{1}{4}$	4.33 to	4.45
Black sheets, Japanese specifications	13 5	to 13 10	64.53 to	65.75
Ship plates	7 12 $\frac{1}{2}$	to 8 2 $\frac{1}{2}$	1.66 to	1.77
Boiler plates	9 2 $\frac{1}{2}$	to 9 12 $\frac{1}{2}$	1.98 to	2.09
Tees	8 2 $\frac{1}{2}$	to 8 12 $\frac{1}{2}$	1.77 to	1.99
Channels	7 7 $\frac{1}{2}$	to 7 17 $\frac{1}{2}$	1.60 to	1.71
Beams	7 2 $\frac{1}{2}$	to 7 12 $\frac{1}{2}$	1.55 to	1.66
Round bars, $\frac{3}{4}$ to 3 in.	7 5	to 7 15	1.58 to	1.69
Steel hoops	10 10	to 11 0	2.28 to	2.39
Black sheets, 24 gage	9 15	to 10 0	2.12 to	2.17
Galv. sheets, 24 gage	13 7 $\frac{1}{2}$		2.96	
Cold rolled steel strip, 20 gage, nom.	14 0	to 14 5	3.04 to	3.10

*Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron : (a)		
Belgium	£3 2 $\frac{1}{2}$ s. to £3 4s.	\$15.22 to \$15.59
France	3 2 $\frac{1}{2}$ to 3 4	15.22 to 15.59
Luxemburg	3 2 $\frac{1}{2}$ to 3 4	15.22 to 15.59
Basic pig iron (nom.)		
Belgium	3 0	14.61
France	3 0	14.61
Luxemburg	3 0	14.61
Coke	0 18	4.39
Billets:		
Belgium	4 13 $\frac{1}{2}$	22.77
France	4 13 $\frac{1}{2}$	22.77
Merchant bars:		C. per Lb.
Belgium	5 4	1.13
France	5 4	1.13
Luxemburg	5 4	1.13
Joists (beams):		
Belgium	4 15	1.03
France	4 15	1.03
Luxemburg	4 15	1.03
Angles:		
Belgium	5 5	1.16
1/8-in. plates:		
Belgium (a)	6 8	1.41
Germany (a)	6 8	1.41
1/8-in. ship plates:		
Belgium	6 3	1.36
Luxemburg	6 3	1.36
Sheets, heavy:		
Belgium	6 1	1.34
Germany	6 1	1.34

(a) Nominal.

submit to him all decisions and agreements on prices before they become effective. In addition, the entire price situation is to be investigated by the Government.

Since the price advance on many products by the syndicate, finished materials have advanced. Apparently, as a result of the agitation caused by these increases, the syndicate has abstained from further advances. The Pig Iron Syndicate has announced unchanged pig iron prices for February. Although unemployment continues to increase, demand for iron and steel continues heavy.

Annual reports of such large companies as the Central German Steel Works, the United Steel Works, the General Electricity Co. and the Linke-Hofmann Corporation all reflected prosperity in 1927. The electrical industry did particularly well and expects some large orders if the French Government carries out its reported plan of accepting reparations payments in electrification of French railroads, ports, canals and colonial projects.

German Steel Mill Reports on Its Operations

HAMBURG, GERMANY, Feb. 4.—The United Steel Works has begun publishing quarterly reports of production and unfilled tonnage. The first of these statistics, covering the final quarter of last year, shows an output of 1,750,000 metric tons of pig iron, compared with 1,660,000 tons in the last quarter of 1926; 1,830,000 tons of steel ingots, compared with 1,780,000 tons in 1926; 6,670,000 tons of coal, compared with 6,550,000 tons in 1926; and 2,300,000 tons of coke, compared with 2,140,000 tons in 1926.

The total number of employees in the last quarter of 1927 was 183,179, of which 5173 were in the coal mines and the rest in the iron and steel departments. The number of employees was about 1.25 per cent greater than in the same quarter of 1926. By the end of January, 1928, the total of unfilled orders was 1,490,000 metric tons of steel, about 34 per cent more than in January, 1927, and about 99 per cent greater than in January, 1926.

Italian Company Books Foreign Locomotive Order

HAMBURG, GERMANY, Feb. 4.—Considerable interest has been aroused among German locomotive builders by the report that an Italian company, the Societa Italiana Ernesto Bredo at Milan, had received an order for 10 of a total of 39 locomotives purchased by the South African railroads. This is said to be the first export order taken by an Italian locomotive builder since the war. The remaining 29 locomotives on the list went to the North British Locomotive Co. German builders expect that Italy will continue as a competitor for overseas business in locomotives.

Germany Increases Imports of Tin Plate

HAMBURG, GERMANY, Feb. 4.—There was an increase of about 300 per cent in Germany's imports of tin plate in 1927 compared with 1926. German tin plate production is only about 100,000 tons a year, while consumption is about 150,000 tons annually. Of the total imports last year Welsh mills supplied 26,212 tons, compared with only about 5838 tons in 1926. The remaining tonnage came from Belgium and France, with a few small lots from the United States. German consumers evidently like the quality of American tin plate, and increased sales might be possible if the market were properly cultivated.

Exports of copper from the United States in 1927 are reported by the Bureau of Foreign and Domestic Commerce at 538,403 net tons, with a value of \$150,163,302. This value is double the figure given for steel mill manufactures, which aggregated \$73,871,825. It is within 6 1/2 per cent of the total of finished and semi-finished iron and steel, which was \$160,631,441.

French Iron and Steel Output and Exports in 1927

PARIS, FRANCE, Feb. 2.—The total production of steel in France in 1927 was 8,275,000 metric tons, compared with 8,386,000 tons in 1926. Of this total, 5,858,000 tons was basic Bessemer, 2,251,000 tons open-hearth, 91,900 tons electric furnace steel, 59,900 tons acid Bessemer and 11,200 tons crucible steel.

The total pig iron output for 1927 was 9,293,000 tons, compared with 9,393,000 tons in 1926. Of this total, 7,162,000 metric tons was basic, 1,200,000 tons foundry, 38,000 tons phosphoric forge iron, 373,000 tons foundry grade hematite and 304,000 tons hematite, foundry and Bessemer iron.

Iron and steel imports totaled 97,194 metric tons, compared with 129,640 metric tons in 1926. Exports totaled 4,715,142 metric tons, compared with 3,471,258 tons in 1926. Of the total exports of 835,703 metric tons of pig iron in 1927, the United States received 3484 tons. This compares with 23,977 metric tons of pig iron shipped to the United States in 1926 out of total exports of 702,537 tons. The United States received 43,200 tons of blooms, billets, beams, bars and similar material, compared with 36,051 tons in 1926, and 41,537 tons of castings, compared with 38,592 tons in 1926. Exports of rails totaled 388,048 tons, compared with 322,217 tons in 1926. Of the 1927 total, Germany received the largest amount, taking 72,500 tons compared with 44,647 tons in 1926. Japan received 31,376 tons of rails, compared with 12,282 tons in 1926. The United States took 2694 tons in 1927 and 3768 tons in 1926.

British Iron and Steel Exports Lower; Imports Higher

WASHINGTON, Feb. 20.—Imports of iron and steel products into the United Kingdom increased to 283,921 gross tons in January from 280,520 tons in December, while exports declined to 332,185 tons from 351,795 tons, despite the tendency toward increased output, particularly of raw steel, according to a radiogram received by the Department of Commerce from Commercial Attaché William L. Cooper, London.

Production of pig iron in January was 560,500 tons, compared with 559,100 tons in December, while steel production totaled 626,200 tons and 604,900 tons, respectively. At the end of January there were 148 blast furnaces and 272 open-hearth furnaces in operation.

The principal gains in imports in January were in structural steel and plates and sheets. The most marked declines in exports in January were made in pig iron and ferroalloys, galvanized sheets and rails, while there were gains in such lines as structural steel and tin plate and in railroad material other than rails.

Structural Steel Orders Lower in January; 1927 Was Record Year

WASHINGTON, Feb. 20.—Orders for structural steel in January totaled 165,017 tons, representing 57 per cent of capacity, according to reports received by the Department of Commerce from 195 firms with a monthly capacity of 291,290 tons. Computed bookings amounted to 213,750 tons. Shipments were computed at 210,000 tons. Orders in December, reported by 221 firms with a capacity of 302,195 tons, were 209,429 tons or 69 per cent of capacity. Computed bookings amounted to 258,750 tons and computed shipments were 240,000 tons.

Orders for structural steel in 1927, computed at 3,060,000 tons, representing 68 per cent of capacity, were the highest in the history of the industry, though the greatest rate of operation, 72 per cent, was made in 1925, when computed orders were 2,998,080 tons. The lowest year since 1913, both in orders and rate of production, was 1921, when orders were computed at 1,188,600 tons and output rated at 35 per cent of capacity.

Monthly capacity reached its highest point in 1927, with 363,770 tons, as reported by 435 firms, and the total is estimated at 375,000 tons. There has been a continuous increase in capacity since 1913, when the 435 firms reported 214,200 tons.

Machinery Markets and News of the Works

BUYING IS LESS ACTIVE

February Machine Tool Business May Not Equal That of Last Month

Considerable Inquiry Is Pending but Prospective Buyers Are Somewhat Slower in Placing Orders

MACHINE tool buying has been moderately active in some of the principal buying centers during the past week, but sales are not in keeping with the promise held out by the fairly large inquiry of the past several weeks, and indications are that February business may not equal that of January. A considerable volume of business on which quotations went in last month is still pending, and the disposition to defer purchases is more apparent among various classes

of buyers. The railroads in particular are doing little while the demands from the automobile industry have subsided now that 1928 production schedules are well under way.

Operations of machine tool plants are poorly balanced for the reason that some companies have a fair amount of unfilled business on their books, while others have comparatively little. Builders of high production tools have been getting the bulk of recent orders.

In the Cleveland and Detroit districts manufacturers of automobile parts are among the most active buyers. The chief inquiry from an automobile company is for 20 to 30 centrifugal grinding machines for the Ford plant. The Chicago trade is awaiting the placing of orders against the recent large inquiry of the Santa Fe Railroad. In the East the principal buyers are the General Electric Co. and the Wright Aeronautical Corporation.

The United States Navy will shortly purchase 18 lathes for scout cruisers.

New York

NEW YORK, Feb. 20.

INDUSTRIAL users of machine tools continue moderately active in purchasing, but no business is being closed with the railroads in this district. The General Electric Co., Schenectady, has closed against a number of tools on a list of 12 to 15 pieces of equipment, but still has some large machines to buy. The Wright Aeronautical Corporation, Paterson, N. J., has ordered a number of tools in the past 10 days including several milling machines, two turret lathes and some radial drills.

The New York Central Railroad has a number of outstanding inquiries but has not yet taken any action toward making purchases. The list of the Delaware, Lackawanna & Western Railroad is still open. The other railroads which buy in this district continue inactive.

Recent purchases of tools have included nine 5-in. production hand milling machines by a Detroit motor company, a 16 x 36-in. lathe by a Massachusetts construction company, a No. 1 Sigourney drill by a New Jersey manufacturer, a 13 x 48-in. lathe by a Milwaukee manufacturer, a 20-in. x 12-ft. Boye & Emmes lathe by an Indiana company, a 22-in. x 14-ft. Morris lathe by a Pittsburgh manufacturer, a 13 x 48-in. lathe by a Milwaukee company, a 6-in. vertical shaper by a Chicago machinery company, a 13 x 30-in. lathe by a Connecticut manufacturer, two No. 13 profiling machines by a typewriter maker, a 12-in. vertical shaper by a Cincinnati machine tool builder. A manufacturer in Pennsylvania has closed on the following used machine tools: A 26-in. x 17-ft. Pond lathe and a 30 x 30-in. x 12-ft. Pond planer, a 15-in. Bement slotter and a 2 x 26-in. Pratt & Whitney turret lathe.

Contract has been let by Ward Leonard Electric Co., South Street, Mount Vernon, N. Y., manufacturer of controllers and other electrical apparatus, to John W. Ferguson Co., Paterson, N. J., for a one-story addition, 115 x 116 ft., to cost upward of \$75,000 with equipment.

E. M. Adelsohn, 26 Court Street, Brooklyn, architect, is preparing plans for a three-story automobile service, repair and garage building to cost \$125,000 with equipment.

Mansfield Iron Works, 878 East Forty-third Street, Brooklyn, has acquired property on East Mill Basin, Jamaica Bay section, for establishment of a new plant.

Tillary Chemical & Perfume Laboratories, Inc., 16 Tillary Street, Brooklyn, manufacturer of chemicals and chemical

by-products, is reported planning to rebuild four-story factory recently destroyed by fire, with loss estimated at more than \$50,000 with equipment.

Franz Wolfgang, 535 East Tremont Avenue, New York, architect, has plans for a two-story automobile service, repair and garage building on White Plains Avenue, to cost close to \$100,000 with equipment.

Department of Docks, Municipal Building, New York, will soon begin work on a municipal airport in Mill Basin-Barren Island district, Jamaica Bay, to cost \$500,000, in which amount funds have been approved. Four hangars, each 120 x 140 ft., will be built, with capacity of 50 airplanes; repair and reconditioning shops, fuel storage and distributing plant, and other structures will also be built. Facilities will be provided on Jamaica Bay for seaplanes. It is expected to complete project in the fall. T. F. Keller is chief engineer.

Sanitary Postage Service Corporation, 285 Madison Avenue, New York, manufacturer of stamp vending machines, is disposing of preferred stock issue of \$252,000, portion of proceeds to be used for expansion.

Joseph L. Steinman, 46 West Forty-sixth Street, New York, architect, has filed plans for a six-story automobile service, repair and garage building, 75 x 75 ft., to cost about \$225,000 with equipment.

Board of Education, Great Neck, L. I., contemplates installation of manual training equipment in a proposed high school to cost about \$800,000. Guilbert & Betelle, 24 Bradford Place, Newark, are architects.

R. H. Macy, Inc., New York, has awarded general contract to Barney-Ahlers Construction Co., Metropolitan Avenue, Brooklyn, for a seven-story storage and distributing plant, 140 x 200 ft., at Long Island City. Installation will include elevating, conveying and other material-handling equipment. Project is estimated to cost \$650,000.

Wright Aeronautical Corporation, Paterson, N. J., has work under way on a one-story assembling plant, 70 x 100 ft., for which general contract recently was let to John W. Ferguson Co., to cost about \$65,000 with equipment.

Mapes & Sprowl Steel Co., 227 High Street, Newark, manufacturer of metal sheets and kindred products, has leased portion of a new one-story building on Empire Street, totaling about 15,000 sq. ft. of floor space, and will remove to that location.

G. W. Carnick Co., 421 Canal Street, New York, manufacturer of chemicals, has awarded general contract to Enstice Corporation, 111 Academy Street, Newark, for a three-story factory at Newark, to cost more than \$70,000

with equipment. Russell G. Cory, 30 Church Street, New York, is architect and engineer.

Laskey Body Co., 337 Halsey Street, Newark, recently formed to succeed to plant and business of J. B. Laskey, manufacturer of automobile bodies, has leased building at 243-45 Central Avenue and will remodel for a branch plant, to include departments for production of automobile tops and frames, body repair work, etc.

Kennedy-Van Saun Mfg. & Engineering Corporation, recently at 50 Church Street, New York, is now located at 2 Park Avenue.

Stronach Corporation, 2850 Grand Central Terminal, New York, recently formed to own manufacturing rights of Stronach non-splitting nails, has sold rights to manufacture under existing patents to Stronach Nail Co., Pittsburgh.

Petty & Wherry, Inc., 50 Church Street, New York, distributor of factory, garage, mill and contractors' equipment, has taken over distribution in New York territory of products of Dodge Mfg. Corporation, Mishawaka, Ind.

Kneuer Tail Board Co., Inc., 126 Van Buren Street, Newark, has been organized to manufacture patented spaceless tail board for commercial automobile trucks. Company is interested in purchasing iron-working machinery, such as heavy power brakes, shears, millers, power hack saws and power punches, and will also purchase iron and steel pipe 1 to 2 in. in diameter, 3/16-in. plates, 13 to 16 in. wide in lengths up to 8 ft., and 3/16-in. steel bands, 2 in. wide in lengths up to 20 ft.

Philadelphia

PHILADELPHIA, Feb. 20.

PLANS have been filed by Quaker City Iron Works, Ontario Street and Aramingo Avenue, Philadelphia, for a one-story addition, 140 x 150 ft., to cost about \$40,000 with equipment.

Edward H. Reuss, Jr., Thirtieth and Race Streets, Philadelphia, manufacturer of pipe, heating equipment, etc., is having plans drawn for a one-story pipe-bending and fabricating plant, to cost in excess of \$150,000 with equipment. Philip H. Johnson, Widener Building, is architect.

Philadelphia Suburban-Counties Gas & Electric Co., 712 Locust Street, Philadelphia, is arranging an expansion and improvement program for 1928 to cost more than \$6,000,000, of which amount \$3,954,000 will be used for electric division, and \$2,355,000 for gas department. Work will include an addition to power plant on Barbadoes Island in Schuylkill River, with installation of additional equipment, new transmission lines, substations and miscellaneous construction; extensions will be made in gas properties in Newtown Square and West Manayunk, including installation of compressing equipment, pumping machinery, purifying and other apparatus, with pipe lines. H. H. Ganser is vice-president and general manager.

Silverman & Levy, 313 South Smedley Street, Philadelphia, architects, have plans ready for bids on a four-story automobile service, repair and garage building, 94 x 110 ft., with extension, 20 x 65 ft., to cost close to \$150,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until Feb. 28 for a quantity of gages and reamers for Philadelphia Navy Yard, schedule 8533; also for quantity of tool steel, schedule 8521.

LeRoy B. Rothschild, Heymann Building, Philadelphia, architect, is preparing plans for a two-story motor bus service, repair and terminal building at Thirteenth and Filbert Streets, for Association of Motorbus Owners of Philadelphia and Vicinity, and Del-Bridge Bus Association, both represented by Harold S. Shertz, Liberty Building, attorney, to cost close to \$1,000,000 with equipment.

Brown Instrument Co., Roberts and Wayne Avenues, Philadelphia, manufacturer of pyrometers and other measuring instruments, has plans for a two-story addition, with foundations to provide for an additional floor later, to cost close to \$45,000. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

Philadelphia Rapid Transit Co., 810 Dauphin Street, Philadelphia, has concluded arrangements for purchase of property at 1420-26 Locust Street, through its affiliated company, Motor Real Estate Co., and will have plans drawn for a multi-story motor bus service, repair and terminal building, to cost close to \$1,000,000 with equipment.

John A. Roebling's Sons Co., Roebling, Trenton, N. J., manufacturer of wire and cables, etc., has plans for a one-story rod mill to cost close to \$700,000 with equipment.

Allentown, Pa., M. W. Gross, mayor, is asking bids until March 13 for electrical distribution and control equipment for Kline's Island sewage disposal plant, contract 3, as per plans at office of city engineer.

Bellanca Aircraft Corporation, Arlington, Staten Island, N. Y., will soon ask bids on general contract for initial units of its new plant near New Castle, Del., to cost close to \$100,000 with equipment. Price & Price, Wilmington, engineers, will make surveys.

A steam power house, 24 x 44 ft., will be built by Phoenixville Hosiery Co., Phoenixville, Pa., in connection with a new mill unit, entire project to cost more than \$60,000 with equipment. Clarence Wunder, 1520 Locust Street, Philadelphia, is architect.

Audubon Wire Cloth Co., Audubon, N. J., has asked bids on general contract for a two-story addition, 55 x 94 ft., to cost close to \$20,000 with equipment. Robert Korb is president.

Bridesburg Foundry Co., Bridesburg, Philadelphia, manufacturer of brass, bronze and aluminum castings, has been reincorporated under Pennsylvania laws, but plans no change in management or operations. Statement appearing in these pages on Feb. 9 that company would manufacture iron castings, dies and kindred products was incorrect.

Chicago

CHICAGO, Feb. 21.

THE volume of sales has reacted only slightly from the dip of last week. In the absence of large lists, the Santa Fe inquiry being an exception, dealers are forced to concentrate on small and widely scattered business. Fresh requests for prices are more numerous, but sluggish, and give no indications of closing. The Santa Fe has added a driving wheel lathe, two grinders, a 24-in. lathe and a cold saw to its list. A Milwaukee road machinery manufacturer will soon come into the market and other plants making similar equipment are showing more interest. The International Harvester Co. continues to issue requisitions for miscellaneous items. Production equipment is being sought by the Nash Motors Co. for its Kenosha, Racine and Milwaukee plants.

Interstate Rivet Co., 7850 South Chicago Avenue, Chicago, has been organized to take over small rivet business of Interstate Iron & Steel Co., Chicago. New company will operate under lease small rivet department of Grand Crossing works of Interstate company.

Sangamo Electric Co., Springfield, Ill., will build an addition, 75 x 200 ft., to cost \$75,000.

American Ventilating Co., 228 North LaSalle Street, Chicago, will build an addition, 70 x 103 ft., to cost \$30,000.

Johnson Sheet Metal & Furnace Works, 712 West Seventy-ninth Street, Chicago, will build a one-story shop, 37 x 121 ft. to cost \$12,000.

Elgin Stove & Oven Co., Elgin, Ill., has plans for an addition, 50 x 135 ft., to be completed this spring. Company manufactures complete steel kitchen units, wall cabinets, stoves and refrigerators, and has recently added metal clothes hangers and metal furniture to its lines.

Richardson Rod & Reel Co., 536 Lake Shore Drive, Chicago, manufacturer of steel fishing rods, tackle, etc., has awarded general contract to G. A. Schillinger Construction Co., 2330 North Hoyne Avenue, for a two-story and basement plant, 62 x 120 ft., to cost about \$50,000 with equipment. Van Gunten & Van Gunten, 26 East Huron Street, are architects.

Reliance Die & Stamping Co., 501 North La Salle Street, Chicago, will soon begin erection of three-story plant to cost close to \$125,000 with machinery. A. A. Wickland, 5 South Wabash Avenue, is architect.

H. J. Mapp, 6739 South Western Avenue, Chicago, is considering erection of one-story machine shop, 50 x 100 ft.

Power Engineering Co., Metropolitan Life Building, Minneapolis, Minn., engineer, will take bids in spring for extensions and improvements in municipal power plant at Stoughton, Wis., to include installation of generator, exciter, switchboard, transformers and other equipment.

West End Scrap Iron & Metal Co., 1920 West Michigan Street, Duluth, Minn., is having plans drawn for new works to cost \$20,000 with equipment. Thomas J. Shefchik, Glencoe Building, is architect.

Interstate Power Co., Decorah, Iowa, has plans for new hydroelectric power station, including improvements in power dam and extensions to transmission line, to cost upward of \$200,000. Management & Engineering Corporation, 327 South La Salle Street, Chicago, is engineer.

Denver, Rio Grande & Western Railroad Co., Denver, Colo., is planning extensions and improvements in its locomotive shops at Salida, Colo., including installation of additional equipment.

Produce Terminal Cold Storage Co., Chicago, care of Henschin & McLaren, 1637 Prairie Avenue, architects, will take bids for an eleven-story cold storage warehouse and produce terminal at Fifteenth Place and Throop Street, to cost close to \$1,000,000 with equipment.

Bellefourche Implement Co., Bellefourche, S. D., manufacturer of agricultural implements, etc., is considering erection of a new plant, to cost about \$20,000 with equipment. John Boland, Rapid City, S. D., heads company.

Ford Motor Co., Detroit, is reported planning new assembling works at Pueblo, Colo., to cost in excess of \$150,000 with equipment.

C. W. Olson Mfg. Co., 1300 Quincy Street, N. E., St. Paul, Minn., operating an ornamental iron and steel plant, will rebuild portion of works destroyed by fire Feb. 12, with loss reported at \$30,000 including equipment.

Chicago, Rock Island & Pacific Railroad Co., 179 West Jackson Boulevard, Chicago, is arranging an appropriation of \$1,651,000 for new construction and repair shops, and engine facilities, and \$1,085,000 for new yard facilities.

Pittsburgh

PITTSBURGH, Feb. 20

THERE is a steady flow of single orders for machine tools and most dealers appear fairly satisfied with the amount of business done for the year to date. New inquiries are quite numerous and dealers also are uncovering other needs on visits among buyers. In the heavier equipment there is a good amount of prospective business in cranes. A local builder recently took an order for several mills for the Timken Roller Bearing Co.

Arrangements have been made by Duquesne Steel Foundry Co., Union Bank Building, Pittsburgh, for purchase of complete foundry and steel roll equipment of Tioga Steel & Iron Co., Philadelphia, for removal to its Pittsburgh works, which will be extended for increased capacity. Purchase concludes liquidation of equipment of Tioga plant, which will be closed, company concentrating production at its plants at Easton, Pa., and High Bridge, N. J.

J. F. Bontempo, 423 Franklin Avenue, Woodlawn, Pa., architect, has plans for a two-story automobile service, repair and garage building, to cost about \$90,000 with equipment, and will ask bids before close of month on general contract.

Kennilworth Tile Co., Newell, W. Va., has approved an expansion and betterment program to cost about \$75,000, including installation of tunnel kiln and equipment to double present capacity.

Bailey-Farrell Mfg. Co., Twentieth and Sidney Streets, Pittsburgh, manufacturer of plumbing equipment and supplies, is considering rebuilding portion of its branch plant at Second Avenue and Ninth Street, Huntington, W. Va., recently destroyed by fire, with loss close to \$70,000 including equipment.

United States Engineer, Keenan Building, Pittsburgh, is asking bids until Feb. 28 for one duplex plunger type valve pot pump, circular 285, and until March 9 for two hydraulic turbines, circular 274.

Appalachian Electric Power Co., Bluefield, W. Va., is planning construction of a power substation at Madison, W. Va., and extensions and improvements in transmission line from Yolyn and Lundale, W. Va., to cost more than \$60,000.

United States Engineer, Huntington, W. Va., is asking bids until Feb. 29, for one portable vertical capstan, with gasoline engine and necessary clutch, gears, housing, frame, etc., circular 148.

School District of Altoona, Pa., has engaged H. O. Swoboda, Inc., engineer, 3400 Forbes Street, Pittsburgh, for increasing capacity of its central light, heat and power plant, made necessary by an addition to senior high school now under construction.

W. H. Nicholson & Co., Wilkes-Barre, Pa., manufacturer of expanding mandrels, arbor presses, flexible and compression couplings and steam specialties, have opened sales office at 1669 Montpelier Street, Dormont, Pittsburgh, to serve western Pennsylvania, eastern Ohio and West Virginia. Ralph A. Comstock is in charge.

Fawell Engineering Co., First National Bank Building, Pittsburgh, has been appointed exclusive representative in Pittsburgh district for Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., designer and builder of rolling mills, rolling mill machinery, hydraulic equipment and special machinery.

Buffalo

BUFFALO, Feb. 20.

PLANS are being arranged by American Radiator Co., Buffalo, for early operation of its new plant at Gloucester, N. J., for production of iron castings for radiators and assembling.

H. R. Emerick, 28 Telegraph Street, Binghamton, N. Y., is planning installation of equipment for marble and slate production, including electrically-operated machinery for drilling slabs.

Edward A. Stone, 42 Canfield Place, Rochester, N. Y., and associates have formed E. A. Stone Cutlery Co., capitalized at \$100,000, and plan early operation of a local factory to manufacture cutlery. George T. Stone, 310 West Ninety-seventh Street, New York, is interested in new organization.

Malone Light & Power Co., Malone, N. Y., is disposing of a block of preferred stock, portion of proceeds to be used for expansion in plant and system, including transmission line construction.

Board of Education, Malone, N. Y., plans installation of manual equipment in a new high school to cost \$600,000, for which plans will be drawn by Fuller & Robinson, 95 State Street, Albany, N. Y., architects.

Pierce, Butler, Pierce Mfg. Co., Syracuse, N. Y., manufacturer of heaters, boilers, etc., is said to have plans for a one-story addition to be equipped as a core department.

Houde Engineering Co., 237 Winchester Avenue, Buffalo, manufacturer of automobile shock absorbers, etc., will soon begin work on a two-story addition, 210 x 225 ft., to cost close to \$200,000 with equipment. G. Morton Wolfe, 1377 Main Street, is architect.

Cincinnati

CINCINNATI, Feb. 20.

WHILE machine tool buyers are somewhat hesitant about placing orders for equipment, and a large volume of pending business is being temporarily held in abeyance, bookings this month are expected to be considerably better than in February, 1927, although not equal to the record set in January. The bulk of sales made recently has been outside the automotive industry, this development being significant of a healthier condition in the general industrial field.

Operations continue to be poorly balanced among machine tool builders and it is those with high production tools which are getting most of the business. A local manufacturer has sold six engine lathes to an Eastern company. The United States Government probably in the next 10 days will purchase 18 engine lathes for naval scout cruisers. Aside from a transaction calling for the shipment of seven special automatic lathes to Germany, foreign orders have been negligible.

Plans are being arranged by Cincinnati-Oakland Motor Co., 1026 Gilbert Avenue, Cincinnati, representative for Oakland automobile, for a one and two-story service, repair and sales building to cost \$125,000 with equipment.

Gosite Air Machine Co., 413 West Fifth Street, Dayton, Ohio, has plans for one-story factory to cost about \$50,000 with equipment. Building on site is being razed and new superstructure will soon begin.

Air Corps, Material Division, Wright Field, Dayton, Ohio, is taking bids until Feb. 28 for 26 electric trigger solenoid control assemblies and 26 gun camera mount assemblies, circular 230; also for 1400 tow target assemblies, circular 232; until March 1 for a quantity of aluminum alloy tubing and aluminum sheets, circular 235, and until Feb. 29, for 28,000 lb. sheet iron, schedule 236.

Union Battery Co., 2717 South Troy Street, Memphis, Tenn., has leased property at 305 Trigg Street, for establishment of new plant for manufacture and distribution of automobile batteries.

Peter Fox Sons' Co., Fulton Market, Chicago, food products, is reported planning construction of an ice-manufacturing and cold storage plant on First Avenue, Nashville, Tenn., to cost more than \$250,000 with equipment.

Newport Finance Corporation, Newport National Bank Building, Newport, Ky., Lorimer Scott, secretary, is head of a project to construct a four-story automobile service, repair and garage building at Cincinnati, to cost \$200,000 with equipment.

Chaney Mfg. Co., Pleasant Street, Springfield, Ohio, manufacturer of thermometers and kindred instruments, contemplates an addition and improvements in present factory.

Meehanite Metal Engineering Corporation, 907 Chamber of Commerce Building, Cincinnati, has been organized to manufacture Meehanite metal, a pearlitic iron made in cupola or air furnaces which is said to combine qualities of cast iron and cast steel. At present company is licensing manufacturers to use Meehanite in their own products and is prepared to supply companies which cannot make product in their own foundries.

St. Louis

ST. LOUIS, Feb. 20.

PLANS are being completed by B. F. Mahoney & Co., San Diego, manufacturer of airplanes and parts, care of McDonald & Condie, 502 North Taylor Avenue, St. Louis, architects, for a new plant at Anglum, near St. Louis, consisting of four one-story units, 75 x 260 ft., 30 x 40 ft., 40 x 60 ft., and power house, 18 x 35 ft., to cost about \$75,000 with equipment.

General Brake Service Corporation, 2727 Locust Street, St. Louis, manufacturer of automobile brakes, has plans for expansion to double present capacity.

Western Products Corporation, Kansas City, Mo., care of Henry E. Dean, Kansas City, Kan., attorney, recently formed with a capital of \$100,000, will operate a new plant in Fairfax industrial district for manufacture of special hard rubber goods, including flooring, paving expansion joints, etc. Company is headed by Charles Ora and W. W. Rose.

United Motor Service Co., Twenty-seventh and Warwick Streets, Kansas City, Mo., has leased a two-story and basement building, 100 x 120 ft., to be erected by Scarritt Estate, to cost \$100,000, with equipment. R. H. Sanneman, Lee Building, is architect.

Central Arkansas Public Service Corporation, Hot Springs, Ark., is disposing of a bond issue of \$2,700,000, a portion of fund to be used for extensions and improvements, including transmission lines.

Board of Education, Stillwater, Okla., is arranging fund for a new manual training school, for which plans will be drawn by Philip A. Wilber, Oklahoma Agricultural and Mechanical College, Stillwater, architect.

Paxton-Mitchell Co., 2614 Martha Street, Omaha, Neb., manufacturer of iron castings, has plans for a one and two-story foundry to cost more than \$100,000 with equipment. Austin Co., Euclid Avenue, Cleveland, is engineer.

Schneider Red Granite Co., 1224 Central National Bank Building, St. Louis, is arranging bond issue of \$200,000, a portion of fund to be used for expansion and improvements at plant at Graniteville, Mo., including additional equipment.

Waters Auto Parts Co., 1711 Joplin Street, Joplin, Mo., has plans for a one-story addition, 25 x 35 ft., for which foundations will soon be laid.

Price Box & Basket Co., Neosho, Mo., has work under way on a new one-story mill and plans early purchase of equipment, including crane for unloading and handling logs, shingle machinery, basket machines and auxiliary equipment.

South Atlantic States

BALTIMORE, Feb. 20.

PLANS for second unit of expansion program of Bethlehem Shipbuilding Corporation, Baltimore, are nearing completion and bids will soon be asked on general contract. Structures will be one and two-stories, and with first unit will cost approximately \$1,000,000 including equipment. H. B. Bisbee, Fore River plant, Quincy, Mass., is architect and engineer. J. M. Willis is local manager.

Board of Commissioners, District Building, Washington, is asking bids until March 5 for metal cabinets.

Art Furniture Mfg. Co., Macon, Ga., care of Frank R. Happ, Fourth National Bank Building, architect, recently formed with a capital of \$40,000, has plans for a new one and two-story factory, 50 x 200 ft. and 50 x 165 ft., to cost about \$35,000 with equipment.

Columbus Iron Works Co., Columbus, Ga., manufacturer of stoves and parts, plans installation of grinding machines and other equipment. Company will also purchase stove trimmings from outside plants. C. D. Cabaniss is vice-president.

Chesapeake Mfg. Co., Sharp and Barre Streets, Baltimore, manufacturer of furniture, will soon take bids for a two-story addition to cost about \$35,000 with equipment. David Harrison, 1322 North Central Avenue, is architect.

General Supply Committee, United States Government and District of Columbia, Washington, is asking bids until March 2 for annual supplies for executive departments, including tools, dies, trucks, wire, abrasives, iron, steel, lead, babbitt metal, brass, surveying instruments, castings, electrical equipment and supplies, etc.

Motor Storage Corporation, Charlotte, N. C., has filed plans for a five-story service, repair and garage building to cost \$175,000 with equipment.

Potomac Electric Power Co., Washington, has approved plans for enlargement of its steam-operated electric power house at Bennings to increase capacity by 30,000 kw. Extensions will be made in transmission lines. Entire project will cost upward of \$750,000.

Georgia Portland Cement Corporation, Augusta, Ga., J. L. Hankinson, president, is reported completing plans for construction of first unit of new mill at Sandersville, Ga., to cost close to \$1,000,000 with machinery. Another mill is also being projected on Savannah River, near Augusta.

Central Chevrolet Co., 1233 Hampton Avenue, Columbia, S. C., local representative for Chevrolet automobile, has plans for a three-story and basement service, repair and sales building, 65 x 210 ft., to cost close to \$100,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until Feb. 28 for two ball bearing testing machines for Annapolis Navy Yard, schedule 8496; also for starting motors, generators, distributors, magnetos and spares for motor boat gasoline engines for Hampton Roads Yard, schedule 8508; bench lathes and grinders for Newport Navy Yard, schedule 8523; three fluid pressure scales for same yard, schedule 8524; die castings for Washington Yard, schedule 8532, and until March 6 for steel bars for Eastern and Western yards, schedule 8507.

Savannah River Electric Co., operated by Southeastern Power Co., Birmingham, has secured a Federal permit for a hydroelectric power development on Savannah River, near Greenwood, S. C., entire project to cost in excess of \$20,000,000 with transmission lines.

Detroit

DETROIT, Feb. 20.

A THREE-STORY addition, a portion to be used for storage and distributing service, will be erected by Lieberman & Gittlen Metal Co., 322 Front Street, S. W., Grand Rapids, Mich., to cost more than \$30,000. D. R. McEachron, Associates of Commerce Building, is architect and engineer.

National Utilities Co., Grand Haven, Mich., will dispose of bonds in amount of \$812,500, and 1000 shares of stock, no par value, portion of fund to be used for expansion and betterments, including transmission line construction.

Detroit Edison Co., 2000 Second Avenue, Detroit, is arranging a construction and improvement program to cost \$30,000,000, including increase in capacity at Trenton Channel power plant of 50,000 kw., construction of Delray plant No. 3 and expansion in generating station at Marysville; construction of 120,000-volt steel tower transmission line from Trenton Channel station to Detroit, and similar single steel tower line from Marysville power plant to Northeast substation, Detroit, and other power lines; construction of four new power substations and additions to present substations, and miscellaneous work.

Chevrolet Motor Co., Flint, Mich., is reported to be contemplating a new assembling plant for Southwestern district in vicinity of Dallas, Tex., to cost in excess of \$500,000 with equipment.

Board of Education, Battle Creek, Mich., is considering installation of manual training equipment in high school in east side district to cost \$500,000, for which plans will be drawn by William B. Ittner, 911 Locust Street, St. Louis, architect.

Koestlin Tool & Die Co., 3601 Humboldt Avenue, Detroit, is said to be planning early purchase of a traveling crane and other equipment for installation in a shop addition.

Chrysler Motor Car Co., Highland Park, Detroit, is completing plans for an addition to cost close to \$100,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects and engineers.

United States Radiator Corporation, 133 East Grand River Boulevard, Detroit, is concluding arrangements for purchase of Pacific Steel Boiler Co., Waukegan, Ill., manufacturer of electrically-welded steel heating boilers, and will operate as a division.

Board of Education, Pontiac, Mich., is having plans completed for a one-story manual arts building at high school, to cost \$100,000 with equipment. Childs & Smith, 720 North Michigan Avenue, Chicago, are architects.

Niles Aircraft Corporation, Niles, Mich., has been organized to manufacture special type of monoplane. Demonstration plane has been constructed and company expects to go into mass production shortly. James R. Williams, designer of plane, is president.

Rich Steel Products Co., Battle Creek, Mich., has awarded a contract to Reniger Construction Co., Lansing, Mich., for a branch plant at Marshall, Mich., to cost \$120,000.

The Crane Market

THERE has been a better volume of inquiry for overhead and locomotive cranes during the past week or ten days, but purchasing has been light. The inquiry of the Amtorg Trading Corporation, 165 Broadway, New York, previously reported as calling for 40-ton locomotive cranes for export to Russia, is for five 15-ton, kerosene operated crawl-tread cranes, one 15-ton and one 25-ton standard locomotive cranes. The Phoenix Utility Co., 71 Broadway, New York, is about to close on a 60-ton electric crane. The Reading Railroad, Reading, Pa., has not yet closed on two 250-ton, double trolley overhead cranes.

Among recent purchases are:

Humble Oil Refining Co., Austin, Tex., 10-ton, 40-ft. span and 3-ton, 25-ft. span electric cranes for Pyote, Tex., from Box Crane & Hoist Corporation.

California Edison Co., Los Angeles, two 5-ton, 31-ft. span, 3-motor, overhead cranes from Box Crane & Hoist Corporation.

Fagan Iron Works, Jersey City, N. J., one used 10-ton, 75-ft. span and two used 5-ton, 30-ft. span overhead cranes from McCabe Equipment Co., Philadelphia.

Wallingford Steel Co., Wallingford, Conn., 5-ton, 50-ft. span, 3-motor, overhead crane from Niles Crane Corporation.

Tidewater Structural Material Co., 271 Madison Avenue,

New York, 1-ton hand power crane with electric hoist from Reading Chain & Block Corporation.

Otis Elevator Co., Yonkers, N. Y., a 2-ton electric hoist from unnamed maker.

Griscom-Russell Co., Massillon, Ohio, three 2-ton, 20-ft. span, 3-motor overhead cranes and one 2-ton, 2-motor, monorail hoist, reported purchased.

International Harvester Co., Chicago, 3-ton, 45-ft. span hand power crane through Page Sales Service, from H. L. Conkey & Co.

B. B. Buffaloe & Co., Monroe, La., 3-ton, 36-ft. span hand power crane from H. D. Conkey & Co.

J. J. Normoyle Co., Moline, Ill., 1-ton, 16-ft. span push crane from H. D. Conkey & Co.

Clinton Bridge Works, Clinton, Iowa, ten 2-ton push cranes from H. D. Conkey & Co.

Northern Pacific Railroad, Brainerd, Minn., mast type jib crane from H. D. Conkey & Co.

Mundie Mfg. Co., Peru, Ill., 8-ton, under-brace, jib crane from H. D. Conkey & Co.

Uxbridge Worsted Co., Uxbridge, Mass., 1-ton, 38-ft. span, 3-motor crane from H. D. Conkey & Co.

Indiana

INDIANAPOLIS, Feb. 20.

PLANS have been approved by Auburn Automobile Co., Auburn, Ind., for a five-story factory branch at Los Angeles, for service, repair and sales, to cost more than \$250,000, with equipment. E. L. Cord is president.

Interstate Public Service Co., Indianapolis, has applied for permission to acquire plant and system of Dillsboro Electric Co., Dillsboro, Ind., with transmission line from that place to Aurora, Ind., and plans expansion, including transmission line extensions.

Bishop-Knowlton-Carson Co., 312 North Meridian Street, Indianapolis, architect, will soon begin construction of a three-story automobile service, repair and garage building, 100 x 165 ft., to cost \$180,000 with equipment.

Duesenberg Motors Co., 1511 West Washington Street, Indianapolis, is making improvements and alterations in its plant for increased production of custom automobiles, including machinery replacements, installation of equipment, etc.

Cleveland

CLEVELAND, Feb. 20.

THE full reported in the machine tool market a week ago is still in evidence and applies both to sales and inquiries. There is no demand for round lots of machines for equipping new plants or for extensions and few orders are being taken for more than single machines. Business at present is coming largely from manufacturers of automobile parts. Automatic screw machinery is moving fairly well in orders for one or two machines. Following the placing of some good orders by Michigan automobile companies, buying appears to have subsided in the Detroit territory. The Ford Motor Co. is still buying equipment and is figuring at present on 20 to 30 centrifugal grinding machines.

Plans are being completed by Willys-Overland Co., Toledo, Ohio, manufacturer of Overland and Willys-Knight motor cars, for new plant units to cost more than \$500,000 with machinery.

Car-Van Steel Products Co., Fifth Street, S. W., Canton, Ohio, manufacturer of punches, reamers, wrenches and other tools, contemplates a one, two and three-story addition, to cost more than \$50,000 with equipment.

Liberty Paper Board Co., Steubenville, Ohio, is completing extensions and improvements in former mill of Hartje Paper Co., and will provide equipment for large increase in output.

Serugo Rubber Co., 172 Cole Avenue, Akron, Ohio, is reported planning new mill at Atwater, Ohio, to cost more than \$60,000 with machinery. John Hadfield is president.

Toledo Edison Co., Toledo, Ohio, is arranging an expansion and improvement program to cost about \$2,000,000, of which approximately one-half will be used for an addition to steam-operated electric power plant, with installation of fourth turbo-generating unit and accessories. Transmission

line will be built from Toledo to Sandusky, Ohio. C. L. Proctor is vice-president and general manager.

Packard Motor Car Co., Detroit, has awarded a general contract to Sam W. Emerson Co., 1836 Euclid Avenue, Cleveland, for a two-story service, repair and sales building at Carnegie Avenue and East Ninety-third Street.

Gulf States

BIRMINGHAM, Feb. 20.

PLANS are being completed by John E. Mitchell Co., 600 South Sixth Street, St. Louis, manufacturer of cotton ginning and flour mill machinery, for a new plant at East Dallas, Tex., primarily for manufacture of parts for ginning machines, to cost \$90,000.

Board of Education, Beaumont, Tex., plans installation of manual training equipment in a new senior high school to cost \$1,000,000. A special election has been called in April to approve a bond issue. An architect is being selected to prepare plans.

Long-Lewis Hardware Co., 2014 Second Avenue, Bessemer, Ala., will take bids early in March for a two-story storage and distributing plant in Smith Park section, Birmingham, to cost close to \$40,000. Denham, Van Keuren & Denham, Comer Building, Birmingham, are architects.

Alabama Power Co., Birmingham, is disposing of a preferred stock issue to total about \$1,950,000, a portion of proceeds to be used for expansion, including hydroelectric power plant and transmission line construction.

Mason Brown Ice & Coal Co., Huntsville, Ala., has purchased property at Decatur, Ala., and plans erection of one-story electrically-operated ice-manufacturing plant, to cost \$65,000 with equipment.

Port Compress Co., Laredo Street, Corpus Christi, Tex., plans extensions and improvements in cotton compress plant, including installation of high-density press, boilers, and other equipment, material-handling and conveying machinery, to cost more than \$250,000.

S. R. Morgan & Co., Rector Building, Little Rock, Ark., has acquired property at Aberdeen, Miss., as site for new ice-manufacturing plant to cost about \$90,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in a new plant at East Dallas, Tex., to be erected by Mrs. Baird's Bread Co., Fort Worth, Tex., two-stories and basement, to cost \$200,000 with equipment.

Amarillo Producers' & Refiners' Corporation, Amarillo, Tex., is planning the early rebuilding of portion of oil refining plant, recently destroyed by fire with loss reported in excess of \$50,000, including equipment. New structure will have a capacity of 1500 bbl. per day. W. S. Roberts is secretary.

Dixie Gas & Utilities Co., Port Arthur, Tex., is disposing of bond issue of \$3,000,000 and note issue of \$1,500,000, portion of proceeds to be used for extensions and improvements in natural gas properties, including pipe line construction.

Florida Babbitt Corporation, 42 North Twenty-first Street, Miami, Fla., will erect one-story plant for manufacture of recently patented babbittting machine and parts, to cost close to \$40,000.

Wagner Electric Corporation, St. Louis, has opened sales office at 1006 Washington Avenue, Houston, Tex. Warehouse stocks are now carried by company at both Houston and San Antonio, Tex.

New England

BOSTON, Feb. 20.

SALES of machine tools in this territory the past week increased perceptibly. The Pittsfield plant of the General Electric Co. is reported to have purchased at least a dozen tools valued approximately at \$30,000, including two special purpose radial drills; the Lynn plant also has purchased several pieces of equipment. The Maine Central Railroad is reported to have bought a medium sized lathe, a planer, slotter, drill grinder and a plate machine; a Cambridge, Mass., shop has taken a large compressor; a Worcester shop has bought a 16-in. lathe. A Worcester dealer has sold radial drills, lathes and about 14 miscellaneous tools, all of the foregoing new equipment.

For a new trade school the city of Boston has closed bids on two 14-in. Hendey lathes, five 12-in. tool-room lathes, one 20-in. shaper, one single-spindle sensitive drill and one two-spindle drill, 14-in. American geared head lathe, a Monarch 14-in. cone head lathe, No. 2A Brown & Sharpe milling machine, and No. 13B Brown & Sharpe tool grinder, 23 sheet metal-working tools, and a number of wood-working tools. In used tools, two 8-in. lathes, a duplex milling machine, two upright drills, and a shaper went outside of Boston. Other used tools sold included a power press to a Boston shop, about eight miscellaneous drills, a cutting-off machine and about eight items of grinding equipment. It was by far the best week this year.

New England industrial conditions are improving. It is anticipated that Ford Motor Co. will reopen its Somerville, Mass., assembling plant about March 5. Material has been started there from Detroit. National Acme Co. and Cone Automatic Machine Co., Windsor, Vt., are operating night and day shifts. English & Mersick Co., New Haven, Conn., automobile equipment, is operating at better than 60 per cent with only a moderate stock of goods on hand. Foster Merriam Co., Meriden, Conn., iron and brass castings, is operating at 80 per cent of capacity with finished and raw stocks low. Millers Falls Co., Millers Falls, Mass., tools, is running at 65 to 70 per cent of capacity. William L. Gilbert Clock Co., Winsted, Conn., is operating at capacity; Atlas Tack Co., Fairhaven, Mass., at slightly better than 70 per cent of capacity, and Geometric Tool Co., New Haven, Conn., is doing better than in the closing days of 1927.

Pratt & Whitney Aircraft Co., Hartford, Conn., has received additional Government orders for 96 Hornet and 50 Wasp engines to cost \$1,510,000, bringing the value of orders on books to approximately \$6,000,000.

Bantam Ball Bearing Co., Bantam, Conn., has authorized construction of a new plant at South Bend, Ind., and upon completion company will move from Connecticut. W. S. Rogers is president and W. W. Gager, vice-president.

C. Hammond & Son, 179 North Water Street, New Bedford, Mass., have completed plans for several vocational school units at that city, including a machine shop, electrical shop and other improvements.

Gardner Airport, Inc., Gardner, Mass., is erecting a hangar and one-story, 60 x 150 ft., office and machine shop on Brock farm, between Gardner and Templeton, Mass. Charles H. Hartshorn, 562 Main Street, Gardner, is president.

Worcester Gas Light Co., subsidiary of New England Gas & Electric Association, is preparing plans for either a coal gas or a water gas plant to cost from \$1,500,000 to \$2,000,000. F. H. Golding is manager of New England properties.

Machine shop and the pipe shop of Beacon Oil Co., Everett, Mass., were recently totally destroyed by an explosion and fire. Plans are under way for new and larger shops.

Bids are being received by Royal Typewriter Co., Hartford, Conn., for one-story addition, 35 x 120 ft., to cost about \$50,000 with equipment. Greenwood & Noerr, 847 Main Street, are architects and engineers. Headquarters of company are at 316 Broadway, New York.

Electric Boat Co., 11 Pine Street, New York, manufacturer of submarines, motor boats, etc., with plants at Groton, Conn., and Bayonne, N. J., is completing arrangements for merger with New London Ship & Engine Co., New London, Conn., in which it has heretofore held a substantial interest. New London shipyard will be continued in service.

Charles Street Garage Corporation, Boston, is having plans drawn for a one and two-story addition to its service, repair and garage building at 252 Cambridge Street, to cost close to \$100,000 with equipment. Lockwood, Greene & Co., 24 Federal Street, are architects and engineers.

Cleveland Burial Case Co., 2274 St. Clair Avenue, Cleveland, has acquired the six-story building at 867 Boylston Street, Boston, heretofore held by B. F. Goodrich Co., and will occupy for a new factory branch and distributing plant.

Western Electric Co., 80 John Street, New Haven, Conn., has plans for a two-story factory branch and distributing plant at West Haven, Conn., totaling about 38,000 sq. ft. of floor space, to cost about \$70,000. Engineering department at company headquarters, 195 Broadway, New York, is in charge.

Public Service Co. of New Hampshire, Manchester, has purchased Utilities Power Co., with hydroelectric power station on the Pennigawassett River, vicinity of Laconia, N. H., and will consolidate with its organization. Company has also acquired Ossipee Electric Co., Center Ossipee, N. H., with properties near Conway Electric Co., recently purchased by Public Service Co. Extensions will be made in transmission lines and substation facilities.

Brockton Ice & Coal Co., Lawrence Street, Brockton, Mass., has begun excavations for a one-story ice-manufacturing plant, 100 x 150 ft., to cost about \$100,000 with machinery.

Essex Tire & Supply Co., 118 Central Avenue, Lynn, Mass., has asked bids on general contract for a new two-story and basement works, 60 x 100 ft., to cost about \$50,000 with equipment. G. A. Cornet, 10 Central Avenue, is architect.

Mechanical Devices, Inc., 260 Tremont Street, Boston, has purchased Strathmore mill in Concord, formerly occupied by American Woolen Co., and expects to begin manufacture of cotter pins, nuts, screws, etc., within a few weeks. It was recently stated company would use part of Victory plant at Squantum, Quincy, but owing to limitation of lease that plan was abandoned and mill at Concord was purchased. Watson Hartley is president and general manager.

Milwaukee

MILWAUKEE, Feb. 20.

ORDERS for machine-tools continue at a relatively satisfactory rate, and the volume of business so far this month is generally reported at a higher level than a year ago. There still is, however, a hesitancy on the part of prospective buyers to take action on inquiries, but in comparison with recent months activity is measureably improved. Prospects are excellent and a speeding up of buying is believed to be at hand. Automotive industries are regarded as of best promise, judging by the character and source of current inquiry.

Aluminum Goods Mfg. Co., general offices, Manitowoc, Wis., is deferring for about six months construction of a \$450,000 addition to its branch stamping and drawing plant at Two Rivers, Wis., designed by Lockwood, Greene & Co., consulting engineers, Chicago.

Chicago, Milwaukee & Pacific Railway Co., Chicago, has placed general contract with Henry Danischefsky, 1484 Humboldt Avenue, Milwaukee, for construction of a new freight depot at Milwaukee to cost \$500,000. C. F. Loweth is chief engineer.

Combination Door Mfg. Co., Fifty-seventh Avenue and Mitchell Street, West Allis, Milwaukee, has started work on erection of a one-story addition, 64 x 100 ft., and is in market for miscellaneous wood and metal-working equipment.

Wisconsin Veneer Co., Rhinelander, Wis., has started work on a new mill and plywood factory providing 45,000 sq. ft., and replacing the plant wrecked by fire several months ago. New equipment will be installed throughout. F. A. Marshall is secretary and general manager.

Kurz-Root Co., Appleton, Wis., manufacturer of electrical equipment, is preparing to reestablish its plant recently wrecked by fire, with loss estimated at \$25,000.

J. E. Burke, Fond du Lac, Wis., manufacturer of metal weather strip and other metal building specialties, has incorporated as J. E. Burke Co., capital stock \$250,000. A new plant is about to be established in Milwaukee, but present plant in Fond du Lac will be retained also as a production unit.

Standard Sheet Metal Works, 1411 Thirtieth Street, Milwaukee, is preparing to enlarge its plant and has increased its capitalization from \$30,000 to \$50,000 to accommodate expansion of output and business.

Stanley F. Parker, 963 Mitchell Street, Milwaukee, has taken over factory of former Loewenbach Shoe Co., Cedarburg, Wis., and will equip it for manufacture of a sugar beet

harvesting machine and other agricultural machinery. A corporation is in process of organization to carry on operation.

Board of Education, South Milwaukee, Wis., is taking bids until March 8 for construction of a new junior high school and vocational training institute, 152 x 178 ft., part three stories and basement, and estimated to cost \$250,000. Architects are Parkinson & Dockendorff, LaCrosse, Wis. H. Daehling is secretary of board.

The Atlas Engineering Co., Milwaukee, which recently sold its plaster and mortar mixer business to Chain Belt Co., Milwaukee, has acquired Topp-Stewart Tractor Co., Clintonville, Wis., and will take over plant March 1. Atlas company will continue manufacture of Topp-Stewart four-wheel drive tractor and its own lines of conveyors, loaders and unloaders. Milwaukee plant at Thirty-first and Galena Streets will be retained as a branch office and warehouse. H. W. Zimmermann is president and general manager.

Board of Education, Neenah, Wis., is preparing to take bids on revised plans for new \$400,000 senior high school which also will accommodate present vocational training institute. John D. Chubb, Chicago, is architect. H. V. Zemlock is secretary of board.

Pacific Coast

SAN FRANCISCO, Feb. 15.

APPLICATION has been made by Red River Lumber Co., Westwood, Cal., for permission to construct and operate a hydroelectric power plant on Ash Creek, a tributary of Pit River, to cost \$250,000 with transmission line.

Chain Belt Co., 82 Natoma Street, San Francisco, has leased a one-story factory to be erected at Fifth and Harrison Streets, for a factory branch and distributing plant. Headquarters are at Milwaukee.

United Verde Copper Co., Clarkdale, Ariz., has plans for a one-story foundry, 80 x 120 ft., for production of electric steel castings, to cost more than \$80,000. Headquarters are at 111 Broadway, New York.

Doheny-Stone Drill Corporation, Los Angeles, manufacturer of oil drilling equipment, tools, etc., has awarded general contract to C. L. Peck, H. W. Hellman Building, for a one-story unit, 60 x 90 ft., at its new plant to be located at Torrance. It will be equipped as a change building. Entire plant will cost about \$225,000. Hamm, Grant & Bruner, Ferguson Building, are architects.

Southern California Edison Co., Los Angeles, is planning construction of a steel tower transmission line from Saticoy to Castaic, Cal., about 44 miles, to cost \$400,000.

Keenan Machine Works, 2925-29 First Avenue South, Seattle, has awarded contract to H. D. Stewart, 2702 First Avenue South, for a one-story machine shop addition, 60 x 75 ft., to cost about \$20,000 with equipment.

Queen City Improvement Co., Seattle, has filed plans for a six-story automobile service, repair and garage building, 90 x 110 ft., to cost about \$160,000 with equipment.

Signal Gas Co., Long Beach, Cal., is planning to rebuild portion of its oil refinery absorption plant destroyed by fire Feb. 10, with loss close to \$90,000 with equipment.

Snow Mountain Water & Power Corporation, San Francisco, has secured permission to use waters from South Eel River, Lake County, for a hydroelectric power development with initial capacity of 21,680 hp., to cost \$3,200,000, including power transmission lines and power dam.

Orange County Refining Co., Newport Beach, Cal., is planning to rebuild portion of oil refinery recently destroyed by fire, with loss reported more than \$100,000 including equipment.

Whitehouse & Price, Hutton Building, Spokane, Wash., architects, have plans for a five-story and basement automobile service, repair and garage building, to cost \$450,000 with equipment.

Zellerbach Paper Corporation, Sacramento, Cal., is said to have plans for new pulp and paper mill in Tongass National Forest district, Alaska, to cost in excess of \$7,000,000 with equipment.

Associated Supply Co., 724 Pacific Electric Building, Los Angeles, has organized purchasing department under direction of S. A. Joseph, and is receiving all quotations, contracts, discount rates and catalogs at that address. Company was recently purchased by Youngstown Sheet & Tube Co., Youngstown, Ohio, and engages in distribution of oil field equipment.

Royal-Rochester, Inc., has been organized as a service company in California for Robeson-Rochester Corporation, Rochester, N. Y., manufacturer of hardware specialties and cutlery. New company will have office in Los Angeles and will be equipped to replace parts and make repairs on all appliances made by Rochester company.

Isler Metal Works, 109 East Twelfth Street, North, Port-

land, Ore., is installing new power press for forming sheet metal up to No. 10 gage.

Rose City Ironcraft Shop, Portland, Ore., has moved from 1431 Macadam Road to 1400 Macadam Road. New motors and acetylene welding outfit have been added and company expects to begin manufacture of hand-wrought ornamental iron.

Portland Machinery & Supply Co., Portland, Ore., has moved to 229 Front Street, where warehouse and showrooms have been remodeled.

Canada

TORONTO, Feb. 20

WHILE large lists were absent from the market the past week, machine tool sales maintained the high level of previous weeks this year. A number of companies are increasing their operations and many whose plants had not been fully equipped are now installing new machines. The demand is diversified and comes from practically all parts of the Dominion.

W. Beatty, general manager Beatty Brothers, Ltd., Fergus, Ont., is in market for equipment to manufacture electric washers and other specialties, for installation in a proposed addition.

City Council, Toronto, has purchased site on Queen Street West, for erection of a booster pumping station to cost \$200,000, in connection with proposed \$14,000,000 duplicate waterworks system.

International Pulp & Paper Co., Ltd., Gatineau, Que., is having plans prepared for erection of a box factory to cost \$20,000.

East St. John Dry Dock Co., East St. John, N. B., will build addition to its plant to cost \$20,000.

Western Canada

Western Dominion Collieries, Ltd., 305 Trust & Loan Building, Winnipeg, will start work immediately on construction of an addition to its briquetting plant at Taylortown, Sask., to cost \$200,000.

Pacific Coast Terminals, Ltd., Vancouver and New Westminster, B. C., contemplates erection of a cold storage plant at New Westminster, of reinforced concrete construction, and to cost \$900,000.

Dominion Department of Public Works, Ottawa, Ont., has awarded contract to Parfitt Brothers, Ltd., 1303 Gladstone Avenue, Victoria, B. C., for erection of drydock buildings and Esquimalt, B. C., to cost more than \$15,000.

Foreign

A COMPANY at London, England, has plans for a new low-temperature carbonization plant at Askern, near Doncaster, for handling 3000 tons of coal weekly, to cost close to \$1,000,000 with machinery. American Consulate, London, William L. Copper, commercial attaché, has information regarding project; also at office of Bureau of Foreign and Domestic Commerce, Washington, reference England No. 2/13/28.

Plans are under way for construction of a flour mill at Dniepropetrovsk, Russia, under Government direction, to use American machinery. Information at office of American-Russian Chamber of Commerce, 143 West Fifty-seventh Street, New York.

Rotterdam-Amsterdam Railroad, Amsterdam, The Netherlands, has plans under way for electrification of its line from Amsterdam to Rotterdam, and other branches; project will be carried out under Government direction. Information at office of American Consulate, Rotterdam, Edward A. Dow, consul.

A company in New South Wales, Australia, is planning construction of a plant to manufacture linseed oil, linseed cake and kindred products. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Australia No. 60714; also at American Consulate, Sydney, Australia, Charles F. Baldwin, assistant trade commissioner.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids (no closing date announced) for a steel-covered structural steel frame hangar, 160 x 330 ft., with lean-tos on both sides, 120 ft. long, 20-40 ft. wide, for Coco Solo, C. Z., specification 5569.

Buenos Aires Great Southern Railway Co., Buenos Aires, Argentina, has begun construction of a new grain elevator at Ingeniero White, near Bahia, Blanca, to cost in excess of \$4,500,000. It will have a capacity of 3,000,000 bu. All machinery will be electrically-operated. Construction will be carried out under direction of Henry Simon, Ltd., London, England. Information at American Consulate, Buenos Aires, Dana C. Sykes, consul.

